ISSUE 5
SEPTEMBER 1985
£1

MICRO CHALLENGE

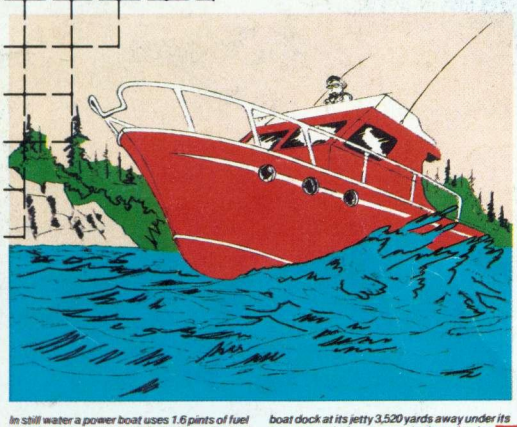
PUZZLES TO SOLVE ON YOUR HOME COMPUTER

SINCLAIR...ACORN...COMMODORE...ATARI...ORIC...AMSTRAD...MSX...
BBC...COMMODORE...IBM...ATARI...APPLE...ACORN...SPECTRUM...B

11

HOMEWARD BOUND

All at sea or heading for a safe beaching? It's a matter of gas guzzling



In still water a power boat uses 1.6 pints of fuel per hour to limp along at 2 mph. An offshore breeze of a certain strength would push the ungovered boat back out to sea at 4 mph. Thus, the boat is forced to double its engine revs just to stand still in the water. Can the boat dock at its jetty 3,520 yards away under its own power before it uses its last six pints of fuel and before its skipper's car is towed away in 45 minutes? Assume that fuel consumption is directly proportional to engine revs, i.e. doubling revs doubles fuel consumption.

WORKSPACE ★★★

TARGET TIME 15 MINS. YOUR TIME.....

16

CHIP INVASION

Can you flee from a chip in nine steps?

It's finally happened — chips have turned against mankind (and womankind . . . Micro Challenge is an Equal Opportunities puzzler). Your task is to free the chips. You have nine steps in which to transform CHIP into FLEE, changing only one letter at each step. Every word formed in this way must be an English word in common usage.

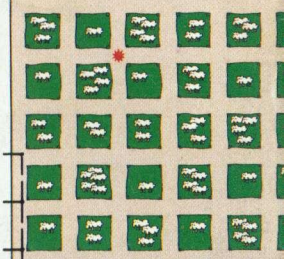
CHIP
FLEE

WORKSPACE ★

TARGET TIME 5 MINS. YOUR TIME.....

PENMANSHIP

Secure your inheritance by counting sheep, but don't dro



Old Macdonald had a farm. He decided to give it to only one of his two sons, but which one? He took them both to the local livestock market and set a test for them. He led them into a field with pens, which were laid out as shown. Their task was to position themselves at the intersection between two paths through the pens so that the four pens nearest to them contained the maximum number of sheep. The first son took pot luck shown. There was a h him. The second son and started wetting numbers of sheep in program to calculate in to claim the maxim win the farm?

WORKSPACE ★

TARGET TIME 25 MINS. YOUR

49

DEVIOUS DIGITS

Replace the wayward digits

9	+	3	−		+	4	= 10
+		+		−		+	
	−		+		+		= 12
−							
	+						
+		+					
8	−		+				

= 22 = 11 = 7 = 2

The number grid has been vandalised. Several numbers in the grid have been smeared with ...nishing cream ... and they've vanished! To you along, the totals of the rows and ... are shown around the edge of the

...CE ★★★

THE FIRST COMPUTER AGE PUZZLE MAGAZINE

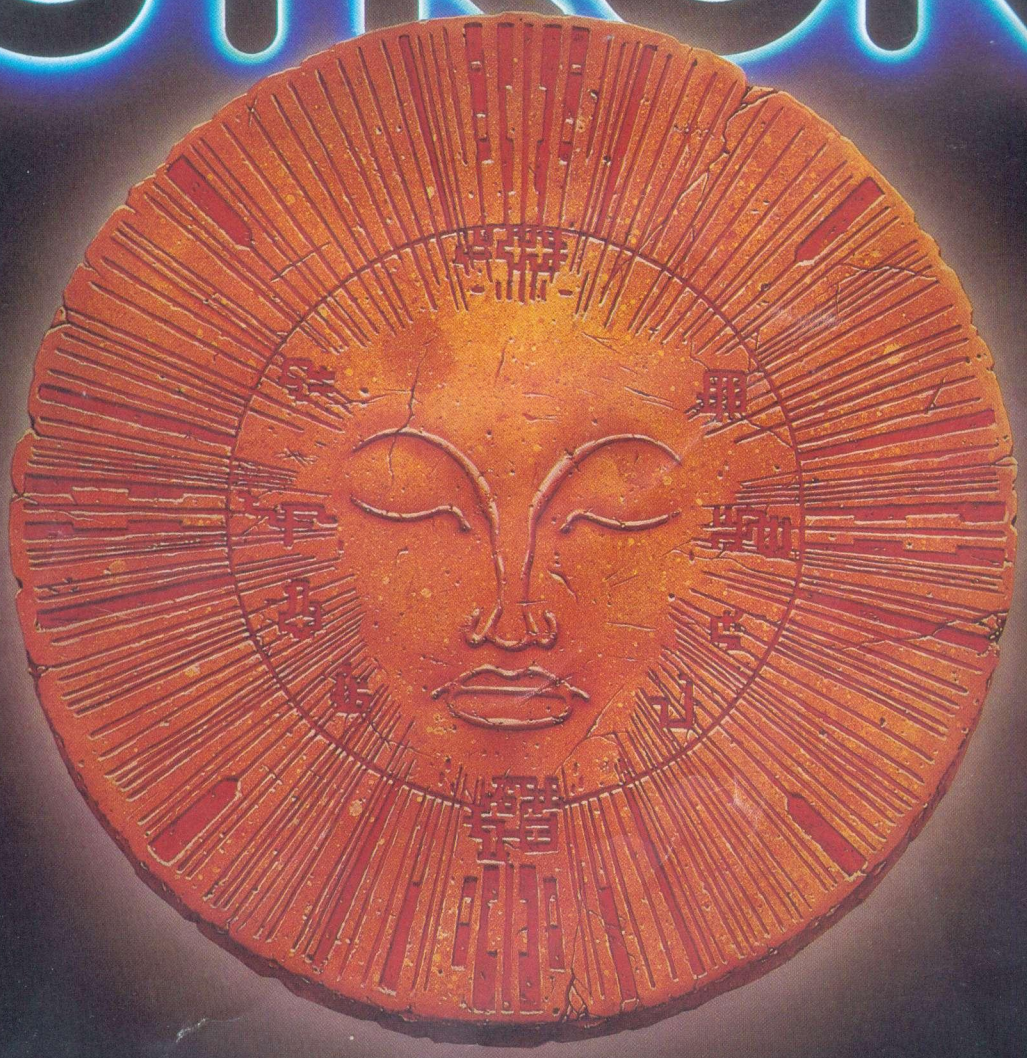
SUPER COMPETITIONS!

Win £300~worth of cash prizes

WIN A
PORSCHE 924
(or cash equivalent)
see pack for details

·TAKE THE CHALLENGE·

GYRON



FIREBIRD

FIREBIRD SOFTWARE · WELLINGTON HOUSE
UPPER ST MARTIN'S LANE · LONDON WC2H 9DL

FIREBIRD IS A TRADEMARK OF BRITISH TELECOMMUNICATIONS PLC.

GOLD EDITION
48K SPECTRUM · £9.95

Volume 1, Number 5 September 1985

MICRO CHALLENGE

CONTENTS

Hello, Welcome 4
Puzzle Symbols 5
Image-in That! 6
Shopping Around 7
Roast Grille 8
Penmanship 9
Supply and Demand 10
Homeward Bound 11
Card Index 12
Plane Sailing 13
If the Cap Fits 14
A Second Fitting? 15
Chip Invasion 16
Cosmic Cache Part 5 17
Treasure Map Part 5 18
Answers Supplement 19
Checkpoint/Rules 21
Entry Forms 22, 26
Microview 23
Prizes and Winners 25
This Month's Answers 27
Subscriptions 33
Treasure Map Clues 36
Custard Pi 37
Ammo, Amass 38
Code Cracker 39
Pass Masters 40
A Fitting Feat 41
One Man Went to Mow 42
The Grid-Iron Game 43
Go Fer Yer Gun 44
Program Poser 45
Number Crunching 46
Worlds Apart 47
Alphabet Soup 48
Devious Digits 49
Bits 50

The October issue of MICRO CHALLENGE will be on sale on September 26, 1985

Editorial: *inTEXT . . ., 21 Braybrooke Gardens, London, SE19 2UN*
Consultant Editor: *Ian Graham*
General Manager: *Mel Lewis*
Production & Design: *Footprint*
Tel: 01-228 8489
Marketing & Promotions: *Sally Beck*
Tel: 01-870 3686

Published by Puzzle Corner Ltd.
UK Office — Somers House, Linkfield Corner, Redhill, Surrey, RH1 1BB. Telephone: (0737) 69799
Distribution — *COMAG, Tavistock Road, West Drayton, Middlesex UB7 7QU*
Tel: (0895) 444055 Telex: 8813787
Printed in UK
Typesetting by: *P&P Photosetting*

Details of advertising and distribution are available from the publishers. Please address all other correspondence about the magazine to our editorial office. We regret that we cannot deal with editorial enquiries by telephone.

©1985 Micro Challenge
Micro Challenge is protected by copyright. No part of this publication may be reproduced without written permission from the publishers.

MICRO CHALLENGE

Now it's time for the September Micro Challenge and, before going on to any other topics, yet another earnest editorial plea for further input from you, our readers. We're extremely grateful to all those of you who've taken the trouble to communicate with us so far, but still we want more.

You may have noticed that there's a section of this magazine entitled 'Microview'; it's what might otherwise be termed the letters page (or pages), and it's yours. Yes, we are talking to you. We want you to make use of your space — more use, and better use . . .

What's a letters page for? What should appear on it; what's published on it at the moment, and what's conspicuous by its absence? Up to now, apart from the occasional — very welcome — puzzle submission, the content has largely consisted of people's views of Micro Challenge, and these have been predominantly favourable. So what's wrong with that?

The main trouble, if that's not too strong a term for it, is that not enough you have been taking advantage of the facility to talk to the rest of the readership. Telling us how wonderful (or dreadful) we are is most kind, but it's not exactly earth-shatteringly inspiring — or even involving for all the others reading it.

Having repeatedly told you that it's your magazine, and that Microview is your space within it in particular, it may seem inappropriate for us now to tell you what you ought to be doing with it. Sorry if you take offence. As editors, though, one of our roles must surely be to prompt anybody and everybody to make Micro Challenge a better magazine, whenever and wherever possible — so here's what we think . . .

What we'd really like to see is an increase in the type of correspondence that in some way captures the imagination of its audience. Perhaps you have a pet theory you'd like to test, or a question about something that's been puzzling you — either way, why not use your space in this magazine to give it an airing? It needn't have anything to do with Micro Challenge; on the other hand, it could relate very specifically to something we've published. It could simply be a case of inquiring and awaiting a response, or it could be an outspoken pronouncement calculated to provoke outrage.

At present (no insult intended to this month's contributors), Microview is bland. It's neither especially entertaining nor especially useful. It's not even controversial. It could be all of these things. That's what we feel — but it's up to you.

We await your response . . .

MICRO CHALLENGE

The problem and puzzles in MICRO CHALLENGE are now divided into four categories, using differing numbers of star symbols and varying colours to denote estimated degree of difficulty.

One star (green) is the easiest grade. Although puzzles in this category will often be computer-orientated, in many cases you will find that you can solve them purely mentally or with the aid of no more than a few jotted notes. Good for doing on the train?

Two stars (blue) indicate something a little more tricky. Problems in this grade will usually be most conveniently soluble with the aid of a microcomputer; in some cases access to such a device will make a lengthy solution far less time-consuming.

Three stars (red) mean that a problem is relatively complex or involves extensive calculation. Use of a microcomputer is strongly advised; some fairly elementary knowledge of programming will be required in the majority of instances.

Four stars (yellow) warn of a problem that our advisers rate as decidely awkward or challenging. Except for budding Einsteins, use of a computer will almost always be necessary, and slightly stronger programming ability may be called for.

NB We may even, from time to time, introduce 'five star' problems. You can expect these to be extremely difficult . . .

PROGRAM LISTINGS

The computer-orientated problems are not written for any specific make or type of machine. Any small, inexpensive, general-purpose, desk-top microcomputer with a RAM memory of 16k bytes or larger and using BASIC or LOGO programming languages will suffice. Where answers have been given in BASIC or LOGO the listing is written in a 'standard' dialect. Small modifications may have to be made in order to run the program on some makes of machine – refer to your instruction book for advice if anything is unclear.

IMAGE-IN THAT!

Unravel the secrets of a revolutionary new lens

Professor Egghead has developed an inflatable lens capable of changing its shape to achieve any focal length required (until it bursts!). The lens's focal length (f), the distance between an object and the lens (u) and the distance between the lens and the image it forms in the eye (v) are related by:

$$(1/f) = (1/u) + (1/v)$$

If the distance between an object and the eye is fixed at 150 centimetres, your task is to discover an object distance (u), which, when increased by 300%, requires no change whatsoever in the focal length of the lens to bring the image of the object into sharp focus in the eye. This seems illogical — increasing the object distance by such a huge amount, yet requiring no change in focal length — over to you!

WORKSPACE

★★★

TARGET TIME 15 MINS. YOUR TIME.....

Illustration: Phil Gerring

SHOPPING AROUND

Can you sort out the chaos in the shopping bag?

Two shopping bags full of goods each cost the same amount, but the till receipts have been lost. The problem is to find the price of each item and the total cost of the contents of each shopping bag. The first bag contains a magazine, two newspapers and a box of chocolates. The second contains a book, a bag of toffees and a bottle of perfume. If the chocs cost 5p less than 16 times one of the newspapers, the book is 10p less than three bags of toffees, the toffees are 5p less than both newspapers, the chocs are 35p more than the perfume and the perfume cost £3.60, what did each item cost and how much did the contents of each bag cost?

WORKSPACE

TARGET TIME 10 MINS. YOUR TIME.....

Illustration: Phil Gerring

ROAST GRILLE

Put the finishing touches to this mysterious matrix of merveilleux mots

R	O	A	S	T
O				
A				
S				
T				

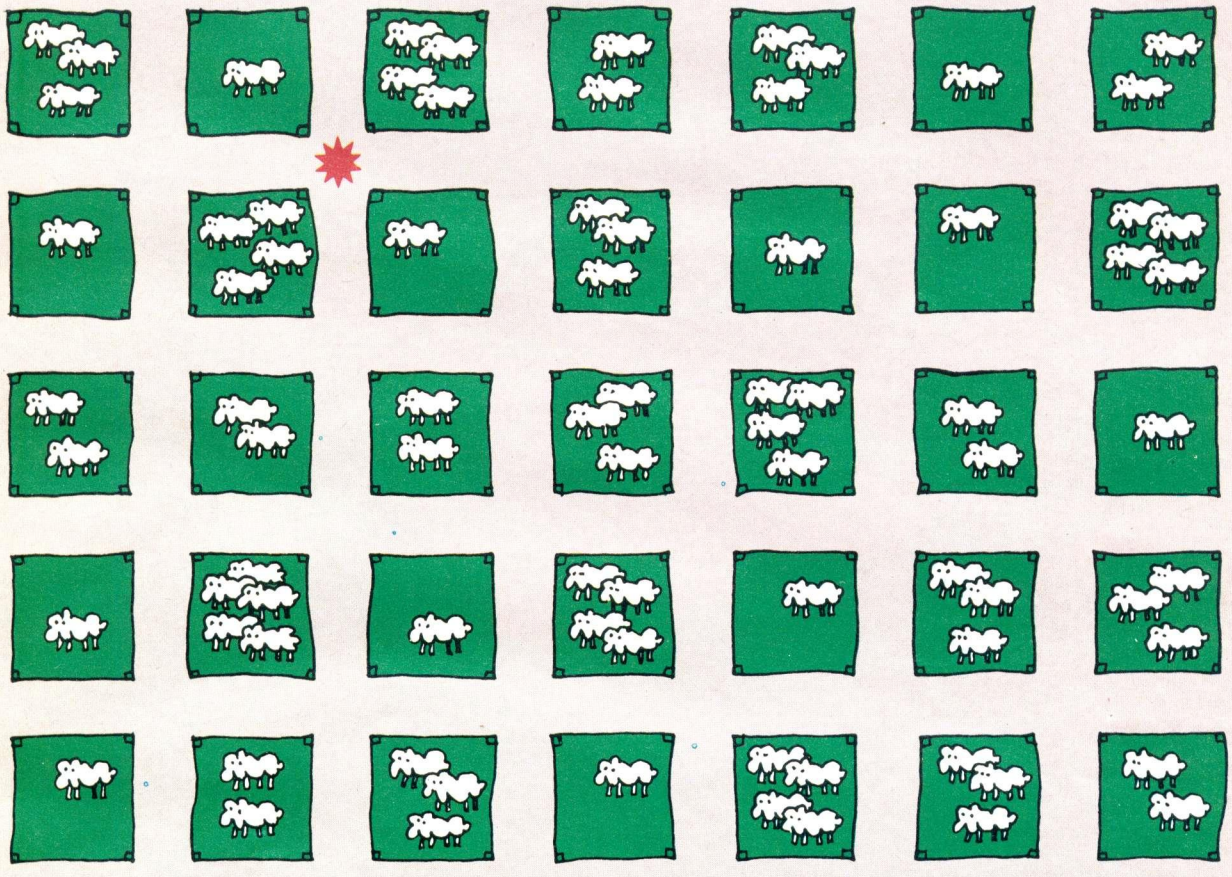
The word grille is starting to roast, but what's needed to finish it off? Fill in the blank spaces so that the words formed across and down the grille make good sense. From top to bottom, the words required are a command to confuse and trades the hair.

WORKSPACE

TARGET TIME 10 MINS. YOUR TIME.....

PENMANSHIP

Secure your inheritance by counting sheep, but don't drop off!



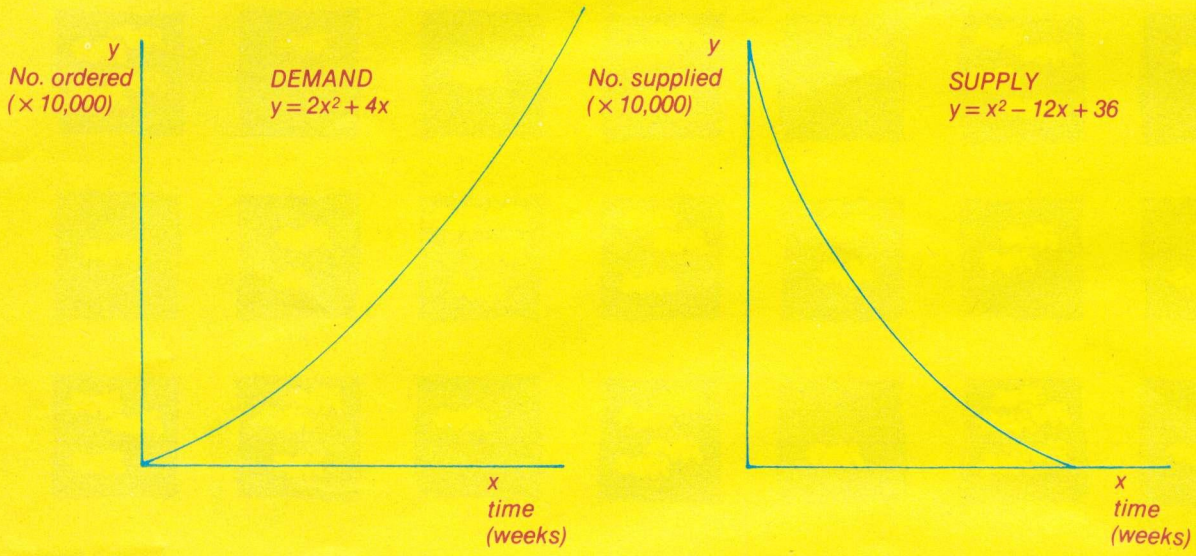
Old Macdonald had a farm. He decided to give it to only one of his two sons, but which one? He took them both to the local livestock market and set a test for them. He led them round the sheep pens, which were laid out as shown. Their task was to position themselves at the intersection between two paths through the pens so that the four pens nearest to them contained the maximum number of sheep. The first son took pot luck and stook in the position shown. There was a total of ten sheep around him. The second son took out his lap computer and started writing a program. Knowing the numbers of sheep in each pen, can you write a program to calculate the best position to stand in to claim the maximum number of sheep and win the farm?

WORKSPACE

TARGET TIME 25 MINS. YOUR TIME.....

SUPPLY AND DEMAND

A tricky balancing act between having a warehouse of Wogans and a crowd of complaining customers



Wogan Enterprises Inc Ltd has just launched a new product on the cuddly toy market (either that or it's the West's new secret weapon) in the shape (if you can call it that) of a wind-up Wogan. Sales are incredible, amazing and altogether wondrous, like the proverbial hot cakes. But, and here's the rub (steady on), after how many days will demand outstrip supply? The demand curve is described by the equation:

$$y = 2x^2 + 4x$$

and the supply curve by:

$$y = x^2 - 12x + 36$$

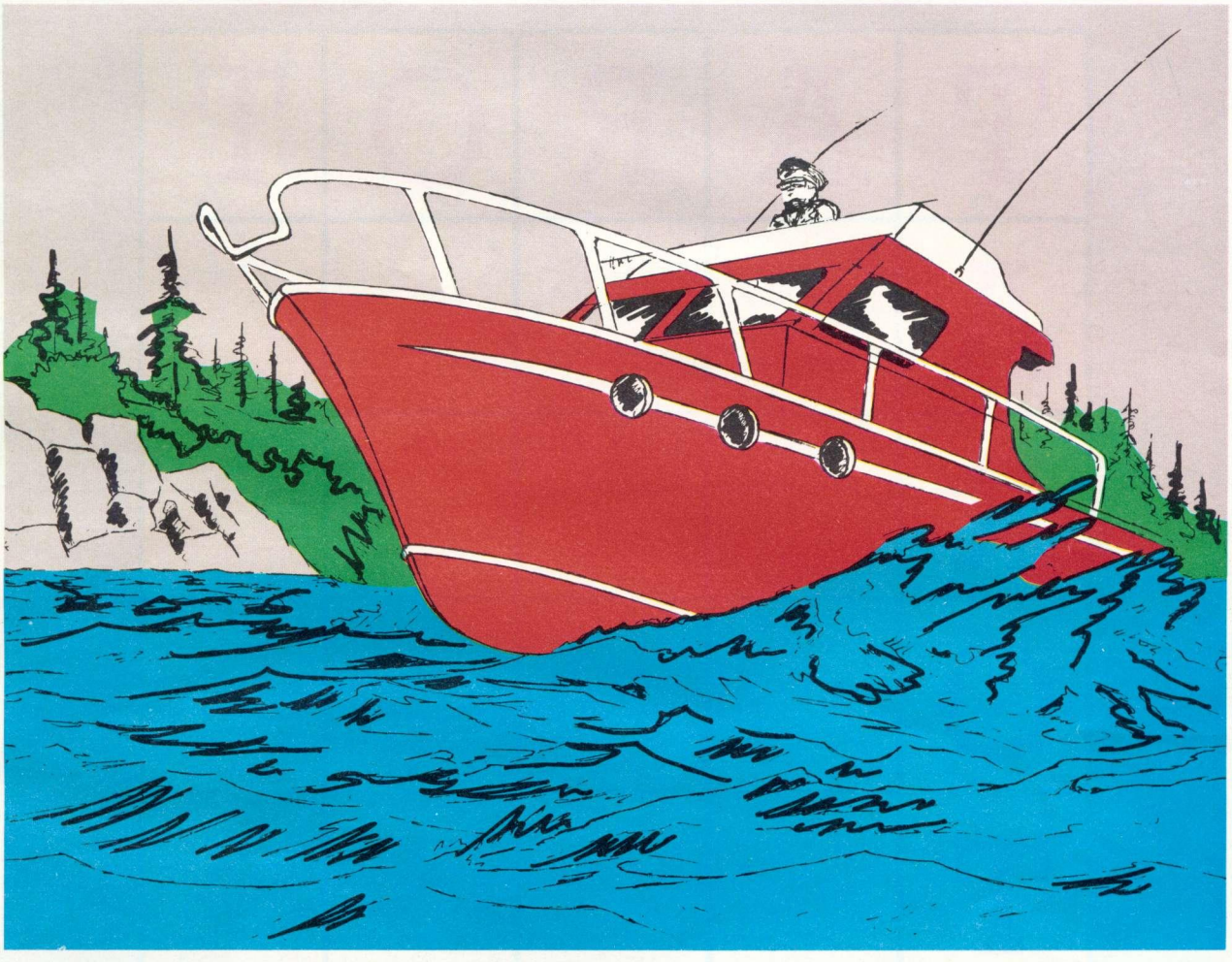
Don't despair, you don't need to be a genius with the algebra to find the answer as long as you can make one assumption and write a simple program.

WORKSPACE

TARGET TIME 10 MINS. YOUR TIME.....

HOMEWARD BOUND

All at sea or heading for a safe beaching? It's a matter of gas guzzling



In still water a power boat uses 1.6 pints of fuel per hour to limp along at 2 mph. An offshore breeze of a certain strength would push the unpowered boat back out to sea at 4 mph. Thus, the boat is forced to double its engine revs just to stand still in the water. Can the boat dock at its jetty 3,520 yards away under its own power before it uses its last six pints of fuel and before its skipper's car is towed away in 45 minutes? Assume that fuel consumption is directly proportional to engine revs, i.e. doubling revs doubles fuel consumption.

WORKSPACE

TARGET TIME 15 MINS. YOUR TIME.....

CARD INDEX

The tarot cards can show the way of future events. Can you predict how the grid should be completed?

T	A	R	O	T
A				
R				
O				
T				

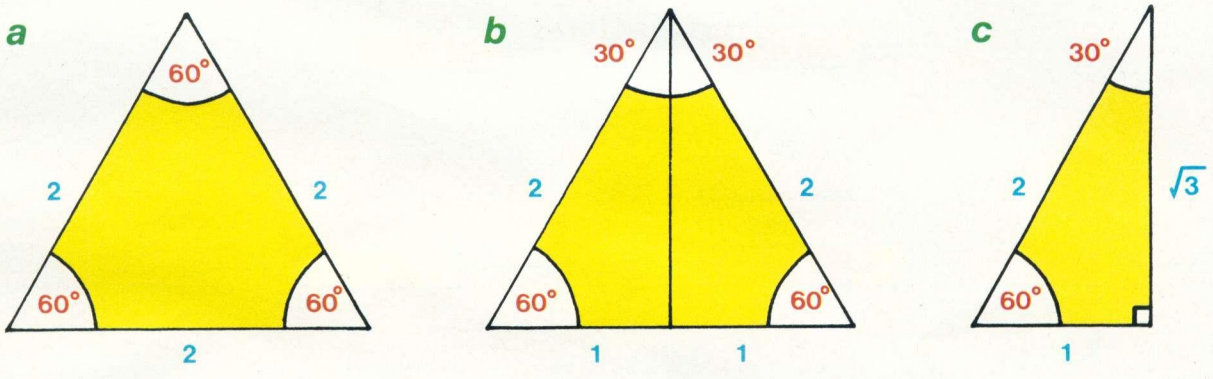
Fill in the remaining blank squares in the tarot grid so that all the words formed across and down make good sense.

WORKSPACE

TARGET TIME 15 MINS. YOUR TIME.....

PLANE SAILING

Can you let power go to a pilot's head or must he throttle back?



The maximum noise level from aircraft overflying the Deffasapost Housing Estate beneath the flight path to Heathwick Airport has been set at 50 decibels. Noise level is related to engine power according to:

Noise level = kSin(x) + c

where 'k' is 50, 'x' is the engine power factor and 'c' depends on the aircraft's height. At 2,500 feet, c is 25. What is the maximum percentage of engine power that a pilot can use when climbing away from the airport, passing over the housing estate at 2,500 feet? The percentage of available engine power is related to engine power factor (EPF) by:

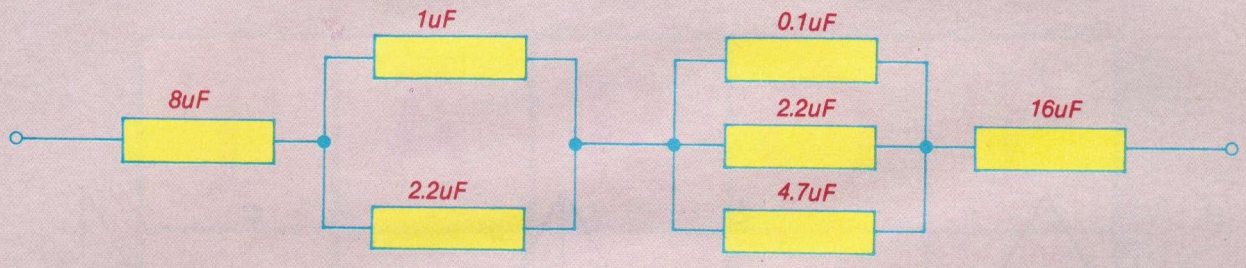
*% power = EPF * 1.11*

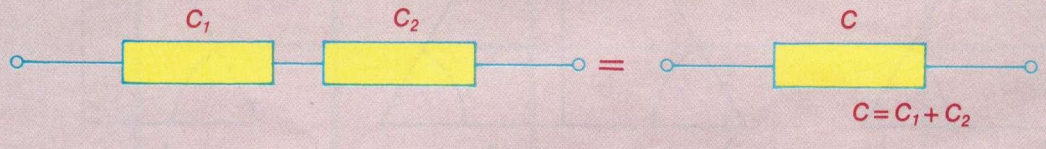
WORKSPACE

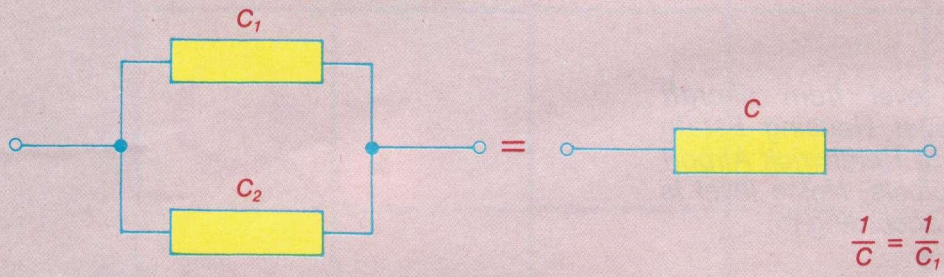
TARGET TIME 5 MINS. YOUR TIME.....

IF THE CAP FITS

Slim down the component count from seven to one







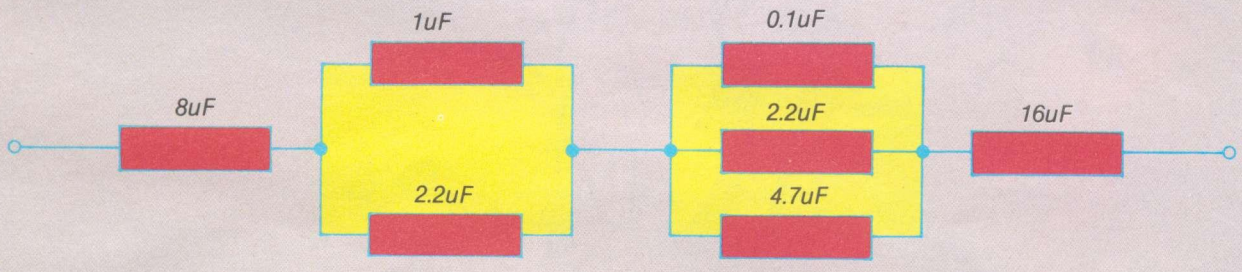
A particular value of electrical capacitance has been achieved by wiring seven capacitors together in the way shown. They behave as a single component. What is the value of the single capacitor that would replace these seven? Everything necessary to solve the problem is shown in the drawing, so you won't have to be an electrical genius to get the right answer.

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

A SECOND FITTING ?

IF THE CAP FITS — PART II. Solved the first instalment? Now get your teeth into the sequel



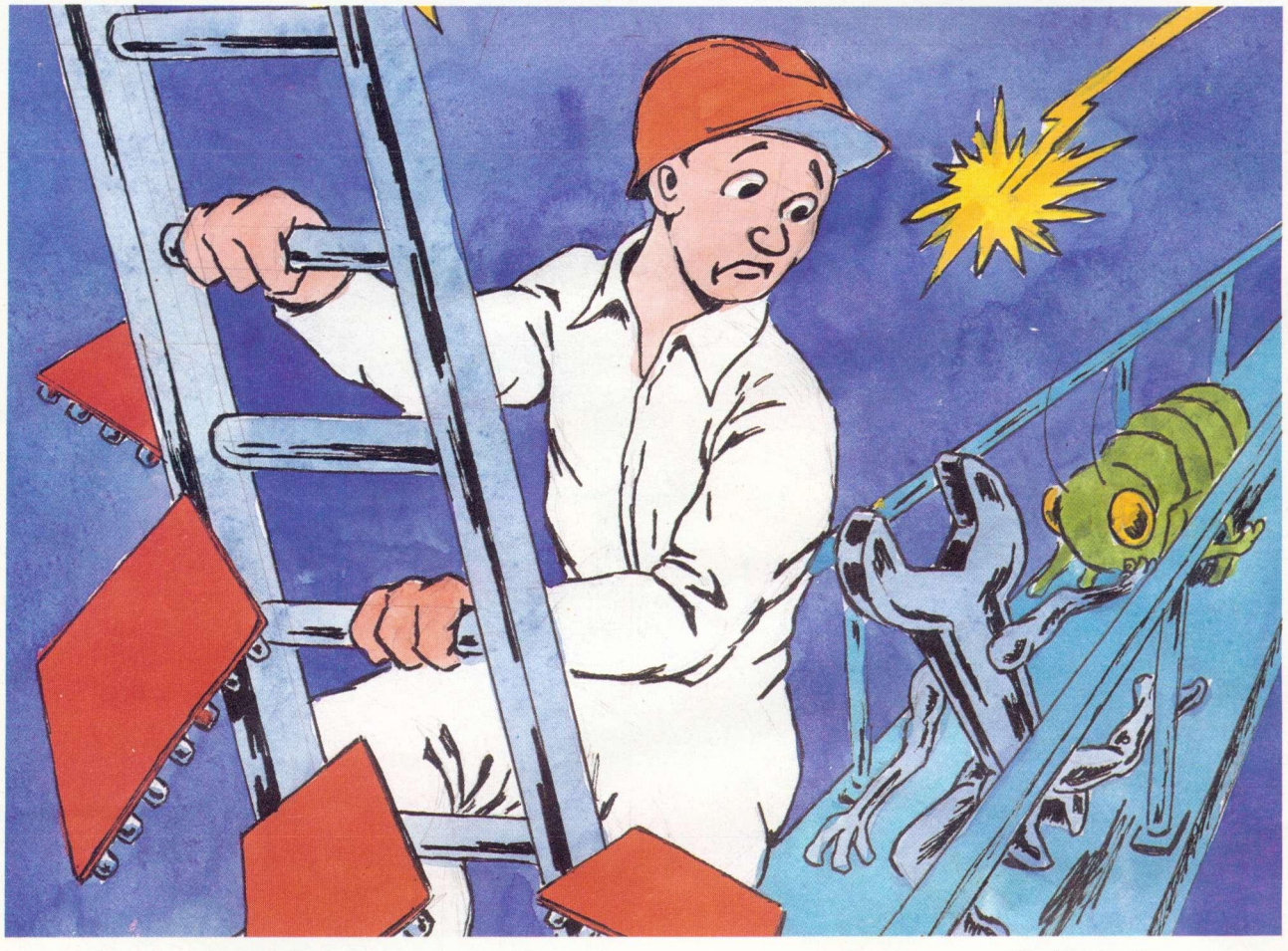
Using the same seven capacitors given in 'IF THE CAP FITS — PART I', find the nearest value to this that can be obtained (i) by using any two of the seven capacitors in series and then (ii) by using any two of them in parallel.

WORKSPACE

TARGET TIME 25 MINS. YOUR TIME.....

CHIP INVASION

Can you flee from a chip in nine steps?



It's finally happened — chips have turned against mankind (and womankind . . . Micro Challenge is an Equal Opportunities puzzler). Your task is to flee the chips. You have nine steps in which to transform CHIP into FLEE, changing only one letter at each step. Every word formed in this way must be an English word in common usage.

C	H	I	P
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
★	★	★	★
F	L	E	E

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

COSMIC CACHE

PART 5

Over the page you will see a portion of a map (pull out the answers section first). Other map sections have appeared in each issue since May, and one further part is due to appear in the next issue of Micro Challenge; you will find that these all combine into a complete map of a little-known corner of the world called Boristia. Your ultimate goal is to track down the location of an amazing series of artefacts left hidden long ago by friendly interstellar visitors (i.e. the competition's 'star prize'!). This involves making your way round a roughly circular route in order to take the necessary instrument readings from various positions.

MICRO CHALLENGE

The philanthropic aliens naturally did not wish their gifts to fall into the hands of savages who would be unable to comprehend the value or use of such advanced electronic equipment. They therefore hid the cosmic goodies extremely carefuly, leaving some subtle clues to their whereabouts which could only be interpreted by a sophisticated intellect (such as your own?) — perhaps with some knowledge of computers. These extraterrestrial hints have only very recently come to light, and we are delighted to be able to give you the first chance of deciphering them.

Every month you are given four of the puzzles to solve. The answer to each is in the form of a letter/number map reference forming one point on the route, within that month's zone of the map. Just to make things a little more awkward, there is no guidance as to the order in which the route runs through the co-ordinates — you must work that out for yourself. The topography of the maps provides some help, though; the visitors did specify that the route would be fairly easy travelling (they were keen to avoid discriminating against disabled people).

MICRO CHALLENGE

Thus it is known that it is never necessary to climb any mountains, cross any rivers or lakes, wade through swamps or cut a path through thickly forested terrain. As you would expect from such advanced and essentially considerate beings, the route is also logical — e.g. it doesn't cross over or cut directly back on itself. In other words, your course will be the nearest thing to a straight line, allowing for geographical obstructions (and, of course, the fact that it is a circular tour, and thus the path curves . . .) OK — with us so far?

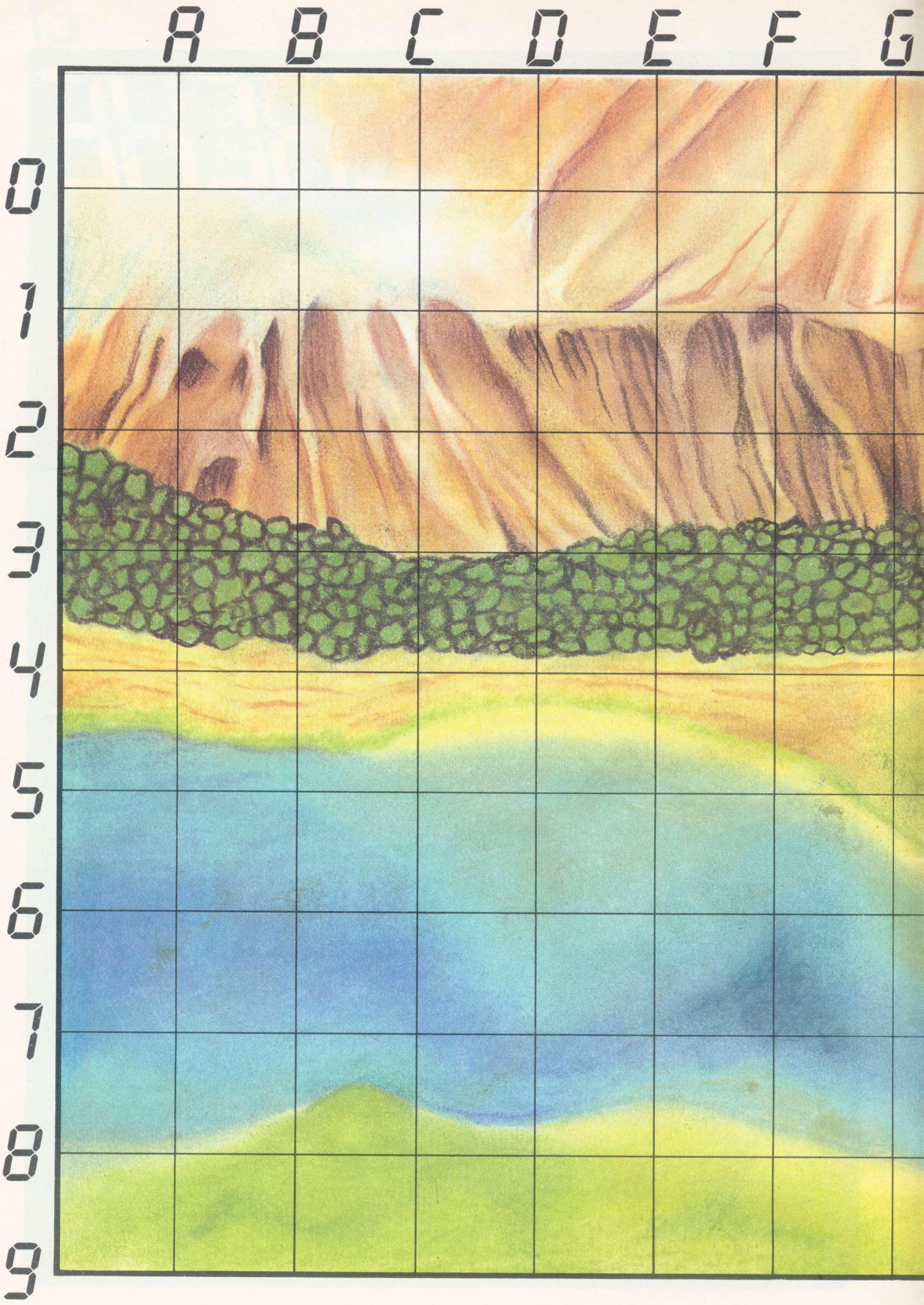
When you have worked out each set of co-ordinates and determined their correct sequence, you can enter the monthly phase of the competition. Fill in the letter/number combinations on one of the entry forms (you'll find them in the answers section) and send it off to us. The first all-correct entry opened after the closing date will win a year's subscription to the mag. Be sure to keep a separate record of the references — you might wish to mark them on the map.

Don't despair even if you can't solve all four puzzles in any issue. Solutions to the first five phases will be published next month (October issue), so you will still be able to go for the star prize even if you've had gaps in your route. Bear in mind, though, that you will still need all six sections of the map, so you will have to buy every issue (back copies are always available from our subscriptions department — there's a coupon in the answers supplement). This is no game for cheapskates!

After month six you will, one way or another, have plotted the entire circuit. At this point you'll encounter one other slight snag — you will not have been told how the six zones fit together to make the complete map; but by comparing the topographical features and the neighbouring co-ordinates, you should not have too much trouble in assembling the whole thing.

MICRO CHALLENGE

At that point you will be able to embark on the ultimate phase to bring you to, wait for it, the STAR PRIZE!!! Our alien buddies have, frustratingly for all of us, not yet communicated the clues for this — but our zeta-wave receiver is tuned in to the secret frequency and we're expecting the vital information in time for issue six. Tough — but you'll have to wait till then for your final instructions.


A
B
C
D
E
F
G
0
1
2
3
4
5
6
7
8
9

MICRO CHALLENGE

SEPTEMBER ANSWERS SEPTEMBER ANSWERS

ANSWERS

COMPETITIONS

LETTERS

ENTRY FORMS

IMPORTANT:

Carefully detach this section of the magazine and keep it in a safe place. The following pages contain all of the answers to the non-prize problems and puzzles in this month's issue of Micro Challenge. Answers for the prize puzzles will be given in the issue after next.

Entry forms for the prize competitions and the order form for UK and overseas subscriptions are also contained in this section of the magazine.

PULL OUT.. PULL OUT.. PULL OUT.. PULL OUT.. PULL OUT.. PULL OUT

LOGICAL THINKER

IS NOW MONTHLY!

To celebrate the increased frequency of Logical Thinker we are delighted to offer postal subscribers a

FREE LOGICAL THINKER PEN

NOTE: Existing Subscribers will receive their pen automatically

To: **LOGICAL THINKER**, Somers House,
Linkfield Corner, Redhill, Surrey RH1 1BB

Please send me Logical Thinker every month and my **FREE PEN**. I enclose a Cheque/PO for £9.60, UK only, (overseas rate on request) to cover twelve issues commencing from .....

Name .....

Address .....

.....

Postcode.....

Cut out the Coupon **NOW!**

CHECKPOINT

The Answers Supplement is a regular feature of MICRO CHALLENGE and you'll find we've included a number of other items that will, we hope, help you to enjoy the magazine.

For instance, there's a 'Microview', our correspondence section. We're always please to hear from you, with comments on the magazine, criticisim, ideas for puzzles or problems — in fact, just about anything you want to pass on to your fellow readers. Write to the address given in Microview, on page 23 in this month's issue.

We're particularly keen to publish your puzzle ideas. You should, by now, have a fair idea of the type of problems we feature — why not have a go? An outline (plus the solution, of course) will suffice; don't forget to include a BASIC or LOGO listing if it's a computer problem, and tell us how long you think it should take to solve. We'll do the rest. All senders of published puzzles will be credited — and we may even be able to find some small reward for especially inspired or intriguing submissions.

You may like to take out a regular subscription to MICRO CHALLENGE: you'll find a handy order form a few pages further on. Remember, we'll pay the postage each month if you live in the UK, so it costs nothing to have your magazine mailed directly to your door.

This month we're featuring two Prize Puzzles (so don't look for the answers to these in this magazine — they'll be published in the next but one issue). Details about the prizes to be won are to be found on page 25. The closing date for entries (apart from the continuing 'Cosmic Cache' treasure hunt) is Wednesday, September 25, 1985.

Please remember to use the official prize puzzle entry forms printed within this Answers Supplement. You can, of course, send in as many entries as you like in one envelope, but please do not use a competition entry envelope for any other correspondence — our non-computerised mail room just won't be able to cope! The correct addresses for Prize Puzzle entries and subscription order form can be found on the relevant pages.

A final point . . . a few of the more enterprising Prize Puzzle entrants in the past have been exploiting a potential loophole in our rules by sending in multiple submissions (all with the same answer) for a single puzzle (usually the one with the most attractive prize!) in an attempt to bolster their chances of being picked out of the hat. Any such 'blanket' submissions that we detect will henceforth be treated as single entries.

PRIZE PUZZLES - GENERAL RULES

1. No employees of Micro Challenge magazine, Puzzle Corner Ltd or Keesing International, or their relatives, may enter any of the prize competitions in Micro Challenge.

2. No correspondence regarding prize competitions will be entered into.

3. The Editor's decision will be final.

4. All entries must be submitted on or accompanied by the entry forms published in each issue of Micro Challenge (one per puzzle entry). No other type of entry will be acceptable. Photocopied entries are not eligible.

5. Entries must be fully completed with the name and address of the sender and the page number of the puzzle attempted.

6. Entries received after the competition closure date wil be disqualified — proof of postage will not be acceptable as proof of entry.

7. The answers and/or solutions to prize puzzles and competitions will normally be published in the next but one issue but due the nature of some types of competition and/or printing or publication difficulties this may not always be possible, in which case any affected solution will appear in the next available issue.

8. Micro Challenge reserves the right to substitute prizes of an equivalent value or cash alternatives in cases where it is impossible to supply the original prize as described in the magazine.

ENTRY FORMS

IMPORTANT:

These forms MUST be used if you wish to enter any of our competitions; submissions on postcards, backs of envelopes, etc., will NOT be acceptable, neither will photocopies. You should, however, include program listings, etc., where relevant. Any such additional material must be securely attached — e.g. stapled — to an entry form. We will publish at least four entry forms in each issue.

You can, of course, enter as many competitions, as many times, as you wish but each entry MUST be made with one of the official forms. It is also important to print the puzzle page number clearly on the form; entries without this essential information will not be considered.

NAME .....
ADDRESS .....
.....
.....
POSTCODE ..... **AGE** .....
SEX (M/F) ..... **Tel No.** .....

Send your entry to:
MICRO CHALLENGE
Department C (specify which month),
Somers House,
Linkfield Corner,
Redhill RH1 1BB

SEPTEMBER ISSUE	PUZZLE PAGE NUMBER
ANSWER/S	
	(NB Please attach any program listings, etc., securely).

NAME .....
ADDRESS .....
.....
.....
POSTCODE ..... **AGE** .....
SEX (M/F) ..... **Tel No.** .....

Send your entry to:
MICRO CHALLENGE
Department C (specify which month),
Somers House,
Linkfield Corner,
Redhill RH1 1BB

SEPTEMBER ISSUE	PUZZLE PAGE NUMBER
ANSWER/S	
	(NB Please attach any program listings, etc., securely).

MICROVIEW

Dear Micro Challenge,

May I congratulate you on an excellent production, unique in its sustained appeal and positive utility? For thos of us just finding our computer 'legs', your magazine is an open door to progress.

Just one question . . . Why did nobody think of it before? Keep 'em coming!

Ian Agar,
Boneybridge, Scotland.

Letters like this (genuine, we promise) leave us speechless — except to say that we know Micro Challenge is, in fact, far from perfect and that we're doing our best to eliminate the errors that have plagued us so far.

Dear Micro Challenge,

To get straight to the point, I think your magazine is fantastic — the best publication since Noah's on 'How To Build A Boat, Collect Animals and Survive A Forty-Two Day Storm'. But alas, it has one fault.

The prizes in your competition in issue two are a bit Spectrum-biased, aren't they? Are you trying to get free gifts off Clive? For me and many more computer owners, these prizes are no good. I am an Amstrad owner, and Spectrum strategy game, data recorder and TV with Spectrum interface would be useless to me.

You do say that your magazine is for all of us, do you not? Pull your socks up.

Kevin Kewley,
Runcorn, Cheshire.

Now, be fair. Amstrad owners are, relatively speaking, in a privileged minority, with their built-in data recorders/disc drives and integral monitors. We try to offer a range of prizes to entice owners of as many different makes of micro as possible. Neither the data recorders nor the monitor TV (with which we happened to be able to throw in a Spectrum interface) that you mention were, in fact, machine-specific. As to games, we do attempt to find examples written for other makes, but it's a simple fact that a great deal more software is offered for the Spectrum than for most micros — and in any case we have to recognise that there are a great many Spectrums (Spectra?) out there amongst our readers, as in the world in general.

Dear Micro Challenge,

I am writing to congratulate you on a wonderful magazine. I am eagerly looking forward to buying the next issue.

I have enclosed with this letter my competition entry and a program listing with details on how I solved 'Triangular Tension' (issue two, page 6). Hope you do not mind me putting all letters and competition forms together, to save money on stamps. I am trying to write some puzzles for you; you should get them soon.

I think T.L. (presumably stands for Total Loudmouth) Strudwick's letter, published in the June issue, is a little (!!) big-headed. Perhaps I should start eating Pedigree Chum, as it must be very good for the brain. I also would like to insult Mr Strudwick's intelligence (?) by saying that some of the puzzles are very difficult. Finally, what does £1 buy nowadays, anyway (perhaps it should be Tightfisted Loudmouth)?

Thanks for the magazine.
PS I have a Spectrum 48K.

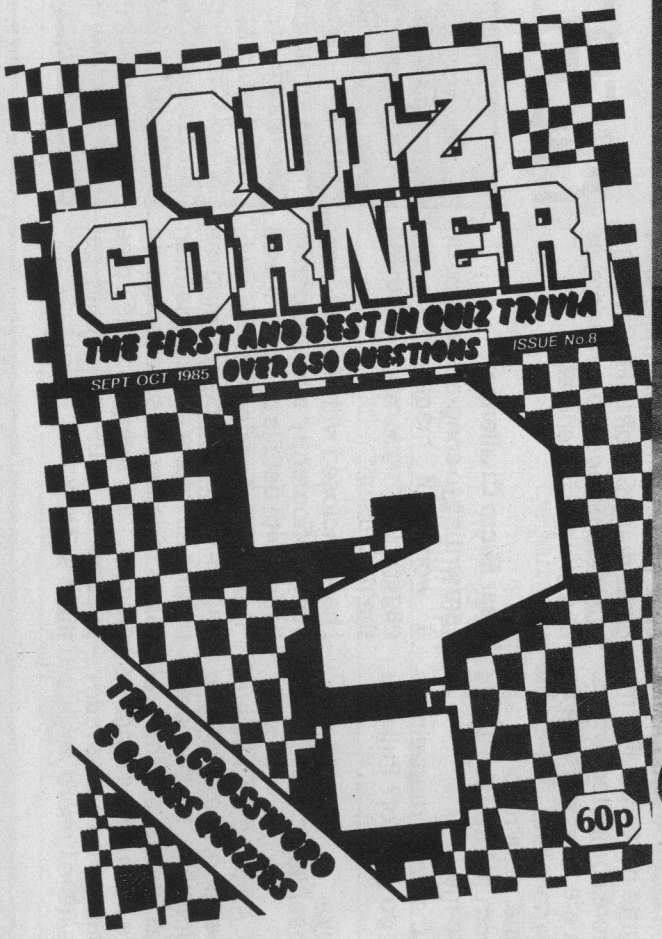
Iain McConnell,
Alsager, Stoke-on-Trent.

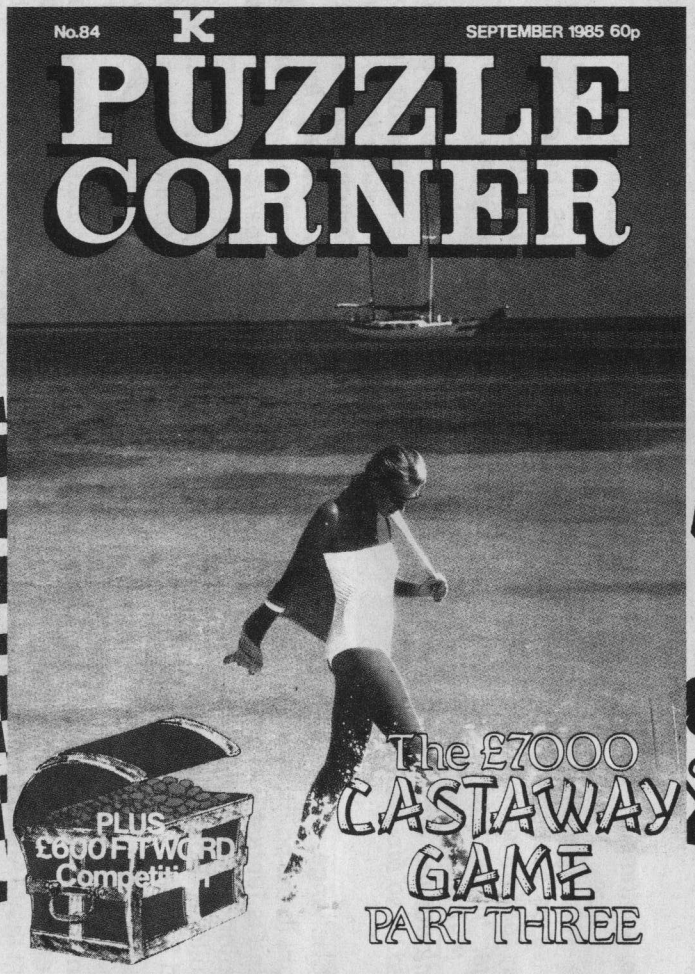
After so much supportive and enthusiastic comment, it seems churlish to raise an objection to anything the above letter, but it's necessary for us to make one negative response. While we've no particular wish to boost the profits of the Post Office, we do have problems in coping with several different items crammed into one envelope. Please — all of you writing to us — don't jam our mail intake system by mixing competition entries with any other form of correspondence. Cheers, Iain.

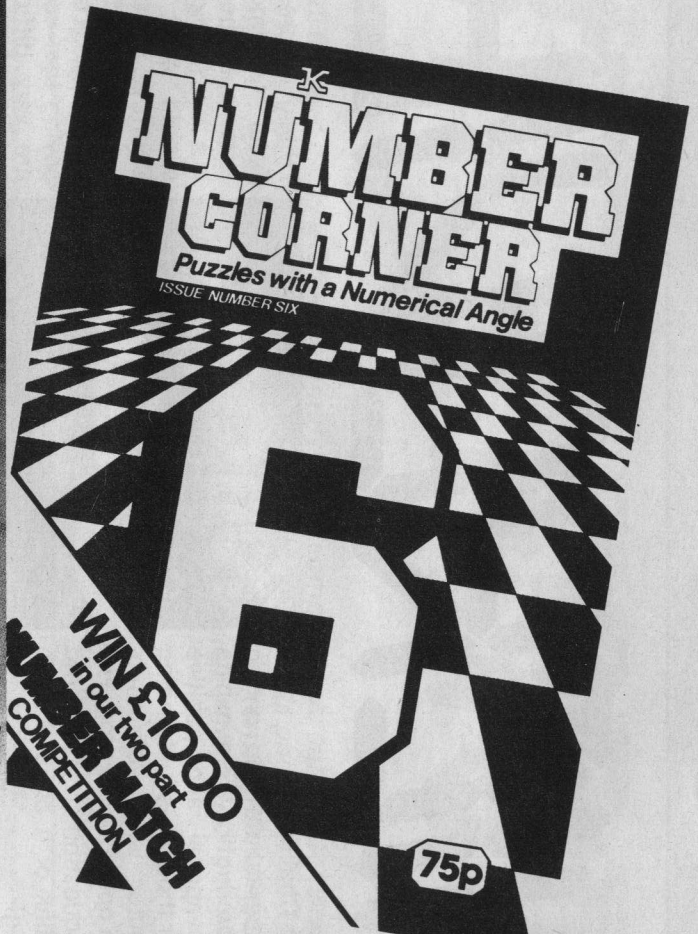
MICROVIEW

Criticisms of the magazine; what you'd like to see in future; what you want to tell somebody else . . . you write it and we'll print it — subject to the usual rights to edit and abridge as necessary, of course. Send your contributions to: Microview, Micro Challenge Magazine, 21 Braybrooke Gardens, London, SE19 2UN. No bribes, no pay-offs — just write if you've something to say!

ON SALE NOW!







THE FIRST AND BEST IN QUIZ TRIVIA

THE BEST GENERAL PUZZLE MAGAZINE

THE ONLY MAGAZINE TOTALLY FOR NUMBER ADDICTS

NEXT MONTH: COSMIC CACHE-WIN AMSTRAD CPC664!

PRIZES·PRIZES·PRIZES

MICRO CHALLENGE

Yes, as always with Micro Challenge, you have the chance to win a number of extremely desirable prizes — but this month, at great expense, we've decided to give you a change. Instead of passing on high-tech hardware, software or similar goodies paid for by the altruism of the relevant manufacturers or distributors, for once only we've dug deep into our own company coffers and come up with nothing but good, old-fashioned cash for you to spend as you like. At least no-one can complain that it's too machine specific . . .

We don't (thank goodness) have a Murdoch or Maxwell at our helm, so forget any dreams of millions. On the other hand, we don't — yet — have a circulation of three or four million either, so you stand a much better chance of winning some of the £300 that we are offering.

There are two Prize Puzzles this month: ***A Second Fitting?*** *(page 15) and* ***Alphabet Soup*** *(page 48). The money is to be split equally between them, and for each there will be three awards: £100 First Prize; £40 Second Prize; £10 Third Prize.*

RULES

As usual, you can make as many different attempts at each Prize Puzzle as you wish, but you may not make multiple entries with the same answer. Each separate entry must be on, or attached to, one of the official entry forms supplied within this month's Answers Supplement; no photocopies or facsimiles will be accepted. Closing date for competitions in this issue is September 25, 1985. No entries received after first post on that day will be considered valid for judging.

Good Luck!

JUNE·PRIZE·WINNERS

PUZZLE 6:
TRIANGULAR TENSION

Ferguson Monitor Television

J. Gribble
32 Cranbourne Road
Hoddesdon
Herts.

PUZZLE 16:
PROGRAM PRIMER

Ferguson Cassette Recorder

A. J. Markham
9 Bishops Walk
Hopton on Sea
Gt Yarmouth
Norfolk NR31 9BQ

Frank Birtwistle
17 Launceston Road
Hindley Green, Hindley
nr Wigan
Lancs WN2 4TQ

J. C. Andrieux
5 Allée du Parc
de la Bièvre
94240 L'Hay les Roses
France

PUZZLE 40:
AERIAL TAG

Lothlorien Overlords Game

Peter Milner
9 Springfield
Littleover
Derby DE3 6EZ

NB. Only one correct entry was received for this competition. The remaining 14 prizes have thus been awarded to runners-up for Puzzle 6, as follows . . .

A. Wilson
63 Herewood Road
Sheffield S5 7UB

W. Lawson
Cilgwyn Mill House
Newport, Pembs
Dyfed SA42 0QN

Carole Underwood
41 Copeland
Bretton
Peterborough
PE3 8YJ

J. Cummings
10 Belsize Lane
London NW3 5AB

John A. Jeffery
17 Meyrick Avenue
Luton
Beds LU7 5JM

Iain McConnell
4 Longview Avenue
Alsager
Stoke-on-Trent
ST7 2DY

David Haynes
16 Heathlands Road
Boldmere
Sutton Coalfield
B73 5DZ

S. R. Williams
52 St Helens Road
Harrogate
N. Yorkshire HG2 8LD

John Davies
31 Edward Street
Oswestry
Shropshire SY11 2BN

D. Thompson
33 Charlton Road
Edmonton
London N9 8HP

W. Jones
111 Priory Road
Dartford
Kent DA1 2BN

Paul Lay
5 Dukes Road
Bilericay
Essex CM11 1BP

Ann Sanders
31 Kirton Close
Blackthorn
Northampton
NN3 4EN

Anthony Siggers
Barn Oast,
Mill Place Farm
Yalding
Kent ME18 6HA

PUZZLE 49:
TWO-HEADED TWIST

Lothlorien Overlords Game

NB. This puzzle was plagued by misprints, and could not be solved as set. Prizes have been awarded to entries giving the most cogent explanation of the errors.

G. J. Suggett
31 Harrow Road
Worthing
Sussex BN11 4RB

S. K. Arora
48 Cavell Avenue
Peacehaven
E. Sussex BN9 7NS

J. C. Cooper
1 Park Crescent
Falmouth
Cornwall TR11 2DL

B. Tunks
33 The Bramblings
Chingford Hatch
London E4 6LT

Alan Prior
41 Walnut Tree Road
Shepperton
Middlesex

D. T. Poyner
67 Auckland Drive
Kingshurst
Birmingham B36 0ND

Martyn Norton
15 Whitley Drive
Streetly
Sutton Coldfield
W. Midlands B74 2EF

Graham Salmon
17 Hookswood Close
Crowborough
E. Sussex TN6 2SF

Steven Brumby
89 St Margarets Road
Bradford
W. Yorkshire BD7 2BY

P. S. Boyland
33 Courtmount Grove
Cosham
Portsmouth PO6 2BH

ENTRY FORMS

IMPORTANT:

These forms MUST be used if you wish to enter any of our competitions; submissions on postcards, backs of envelopes, etc., will NOT be acceptable, neither will photocopies. You should, however, include program listings, etc., where relevant. Any such additional material must be securely attached — e.g. stapled — to an entry form. We will publish at least four entry forms in each issue.

You can, of course, enter as many competitions, as many times, as you wish but each entry MUST be made with one of the official forms. It is also important to print the puzzle page number clearly on the form; entries without this essential information will not be considered.

NAME .....
ADDRESS .....
.....
.....
POSTCODE ..... **AGE** .....
SEX (M/F) ..... **Tel No.** .....

Send your entry to:
MICRO CHALLENGE
Department C (specify which month),
Somers House,
Linkfield Corner,
Redhill RH1 1BB

SEPTEMBER ISSUE	PUZZLE PAGE NUMBER
ANSWER/S	
	(NB Please attach any program listings, etc., securely).

NAME .....
ADDRESS .....
.....
.....
POSTCODE ..... **AGE** .....
SEX (M/F) ..... **Tel No.** .....

Send your entry to:
MICRO CHALLENGE
Department C (specify which month),
Somers House,
Linkfield Corner,
Redhill RH1 1BB

SEPTEMBER ISSUE	PUZZLE PAGE NUMBER
ANSWER/S	
	(NB Please attach any program listings, etc., securely).

IMAGE-IN THAT! 6

Clearly, there are a lot of tedious calculations to be done to solve this relatively simple problem, so it's a job for the computer. The following program takes each value of object distance (U) from 1 to 149 and the calculates the image distance (V) and focal length of the lens (F). The object distance is multiplied by four (i.e. increased by 300%) and the original and new values for focal length are compared to check if they are equal.

```
5REM — INFLATABLE LENS
10 FOR U = 1 TO 149
20 LET V = 150 – U
30 LET P = (1/U) + (1/V)
40 LET F = 1/P
50 LET UNEW = 4 * U
60 LET VNEW = 150 = UNEW
70 LET PNEW = (1/UNEW) + (1/VNEW)
80 LET FTWO = 1/(PNEW)
90 IF F = FTWO THEN PRINT "If the
   object distance is ";U:PRINT" and this is
   increased by 300% to ";UNEW:PRINT"
   the original focal length of ";F:PRINT"
   centimetres remains unchanged"
100 NEXT U
```

You may be wondering why we didn't call the new value of focal length FNEW in keeping with the other parameters. The BBC Micro, on which the program was developed, features a 'function' facility represented by FN followed by the name of a variable. So, it tries to read FNEW as some sort of mathematical function and produces an error message when it fails to do so. Hence FNEW is represented by FTWO.

You should find that increasing an object distance from 30 to 120 centimetres results in no necessary change in focal length.

If it still seems a bit odd, you can look at how focal length changes as you vary the object distance while keeping the total distance between eye and object constant, by running the following program.

```
 5 PRINT "U", "V", "F"
10 FOR U = 10 TO 140 STEP 10
20 LET V = 150 – U
30 LET P = (1/U) + (1/V)
40 LET F = 1/P
50 PRINT ;U, ;V, ;F
60 NEXT U
```

SHOPPING AROUND 7

First, write down all the relationships between the prices of the various items.

(1) chocs + 5 = 16(paper)
(2) book + 10 = 3(toffees)
(3) toffees + 5 = 2(paper)
(4) chocs – 35 = perfume
(5) perfume = 360 pence
Putting (5) into (4):
(6) chocs = perfume + 35 = 395 pence = £3.95
Putting (6) into (1):
(7) paper = (chocs + 5)/16 = 400/16 = 25 pence
Putting (7) into (3):
(8) toffees = 2(paper) – 5 = 2(25) – 5 = 45 pence
Putting (8) into (2):
(9) book = 3(toffees) – 10 = 3(45) – 10 = 125 pence = £1.25

That leaves the magazine unpriced, but we know that the two bags cost the same, so:

(10) mag + 2(papers) + chocs = book + toffees + perfume
mag = book + toffees + perfume – 2(papers) – chocs
mag = 125 + 45 + 360 – 50 – 395 = 85 pence

Putting all the prices calculated into (10), you should find that the contents of each shopping bag cost £5.30.

ROAST GRILLE 8

R O A S T
O R D E R
A D D L E
S E L L S
T R E S S

PENMANSHIP 9

The easiest way to tackle this is to set up an array — a series of 'pigeonholes' in the computer's memory that we can use to represent the sheep pens. Lines 20 to 70 set up this array for the BBC Micro. Other computers may use the DIM (dimension) command in slightly different ways. The sheep pens across the page are identified by a column number (C or COL in the program) and the pens down the page by a row number (R or ROW in the program) so any pen can be represented by PENS(C,R). For instance, PENS(2,4) contains 5 sheep according to the drawing. When the array is set up, each position in the array must be given a value (the number of sheep). Line 50 in conjunction with the DATA statements at lines 190 to 220 does this. Lines 80 to 130 look at each path intersection with four pens surrounding it and calculate the number of sheep in the four pens. If this is a larger number than anything previously calculated,

it is preserved in the variable, MAX, and the row and column numbers that identify the position of the intersection are saved in ROW and COL. Lines 140 to 180 print out the result. You should find that the maximum number of sheep that can be claimed is 12, by standing between columns four and five and between rows three and four. So, the first son, with only ten sheep, loses and the second son wins the whole farm.

```
  5 REM — SHEEP PENS
 10LET MAX = 0
 20DIM PENS (7, 5)
 30FOR C = 1 TO 7
 40FOR R = 1 TO 5
 50READ PENS (C, R)
 60NEXT R
 70NEXT C
 80FOR C = 1 TO 6
 90FOR R = 1 TO 4
100LET SHEEP = PENS (C, R) + PENS
  (C + 1, R) + PENS (C, R + 1) + PENS
  (C + 1, R + 1)
110IF SHEEP>MAX THEN LET MAX =
  SHEEP:LET COL = C:LET ROW = R
120NEXT R
130NEXT C
140PRINT "The maximum number of
  sheep will be won"
150PRINT "by standing between rows
  ";ROW;" and ";ROW + 1
160PRINT "and between columns ";COL;"
  and ";COL + 1
170PRINT
180PRINT "yielding a total of ";MAX;"
  sheep"
190DATA 3, 1, 2, 1, 1, 1, 4, 2, 5, 2
200DATA 4, 1, 2, 1, 3, 2, 3, 3, 4, 1
210DATA 3, 1, 4, 1, 4, 1, 1, 2, 3, 3
220DATA 2, 4, 1, 3, 2
```

SUPPLY AND DEMAND 10

First the algebraic answer. The one assumption you need to make is that the two equations are equal at the point when the supply and demand curves cross over and demand begins to overtake supply. So,

$$2x^2 + 4x = x^2 - 12x + 36$$

or $x^2 + 16x - 36 = 0$

And solving this algebraically,

$$(x - 2)(x + 18) = 0$$

so, $x = 2$ or $x = -18$

$x = -18$ doesn't mean anything in this context

$x = 2$ is the solution we want

The delightful, diminutive dolls will cease to be available after only two weeks — thank goodness!

Using an alternative method, the following program will search for the value of 'x' that satisfies both equations at the crossover point.

```
  5REM — SUPPLY – DEMAND
 10LET INC = 10
 20FOR X = 0 TO 1000 STEP INC
 30LET Y = 2 * X^2 + 4 * X
 40IF Y = X^2 – 12 * X + 36 THEN PRINT
   "Supplies will run out after ";X;" weeks"
   :END
 50NEXT X
 60LET INC = INC/10
 70GOTO 20
```

In principle, the program takes an arbitrary spread of values of X in the supply equation — arbitrary, because we don't know what the answer is — and looks for one of these values of X which satisfies both the supply equation (line 30) and the demand equation (line 40). We could increase the value of X by something like 0.01 each time round the loop (lines 20 to 70) to test the two equations, but it would take an age. To cut the program's running time, first run it with a large interval between the values of X chosen and then progressively decrease the intervals between the sample values of X until the correct value of X is found. In this program, X is first increased from 0 to 1000 in steps of ten (set by line 10), then before the next tour around the FOR .. NEXT loop starts, the increment of X (the interval between the X values) is divided by ten. Using this program, you should find that the sought-after value of X is 2. So, supplies of the cuddly toys will be overtaken by demand in two weeks, when 160,000 have been sold.

HOMEWARD BOUND 11

First, calculate the fuel consumption per mph of boat speed in still water. The boat uses 1.6 pints per hour to travel at 2 mph, or 0.8 pints per hour to travel at 1 mph.

The fuel consumption at 4 mph, equivalent to the engine revs necessary to stand still in the water, is therefore 3.2 pints per hour. The last two miles (3,520 yards) to the shore must be covered in 45 minutes at most. Two miles in threequarters of an hour is equivalent to 8/3 mph. So, the total engine speed necessary to get to the shore in 45 minutes or less is 6⅔ mph times 0.8 pints of fuel per hour per mph. In 45 minutes, the boat uses threequarters of that amount:

$(20/3) * (8/10) * (3/4) = 4$ pints

The boat has more than enough fuel on board, not only to reach the shore but also to do it within the time limit of 45 minutes.

CARD INDEX 12

T A R O T
A P A C E
R A N T S
O C T E T
T E S T S

PLANE SAILING 13

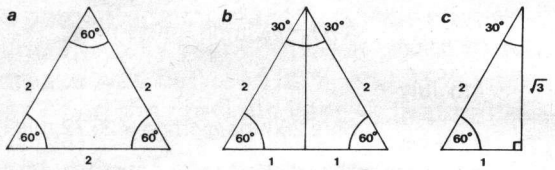
Nothing to it! Using the equation given for noise level:

Noise level = kSin(x) + c
50 = 50 * Sin(x) + 25
Sin(x) = (50 – 25)/50 = 0.5

Using trigonometric tables, the angle the sine of which is 0.5 is 30 degrees. Thus:

Maximum percentage of available engine power = 30 * 1.11 = 33.3%

Incidentally, you can find the angle the sine of which is 0.5 without the need for tables, by a geometrical method.



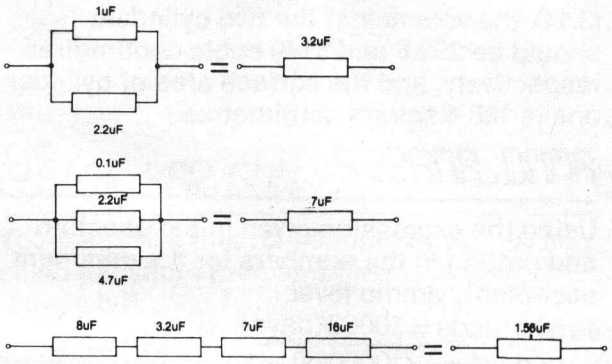
Using this equilateral triangle (all three sides the same length, all three internal angles = 60 degrees), let each side be two units long (a). Drop a perpendicular from the apex to the base, bisecting the base. Each half of the base is one unit long and the angle at the apex is divided into two angles of 30 degrees each (b). I think you can see that if Sin(30) is defined as the ratio of the side opposite the angle to the hypotenuse of the right-angled triangle, then Sin(30) is 1/2 or 0.5. The sine, tangent and cosine of both 30 and 60 degrees can be calculated in this way. The third side of the smaller triangles (c) can be calculated as by Pythagoras's Theorem.

$(2)^2 = (1)^2 + (\text{third side})^2$

$\text{Third side} = \sqrt{(2)^2 - (1)^2}$
$= \sqrt{3}$

IF THE CAP FITS 14

The first part of the problem can be dealt with quite easily by using a calculator. As all the capacitors have values in the same units (uF, meaning microfarads), there's no need to know what these units are, because no conversions are necessary. Each group of parallel components is first transformed into a single component, and then the four components in series can be reduced to only one component.



A single 1.56uF capacitor could replace the seven that were actually used.

A SECOND FITTING ? 15

CHIP INVASION 16

C H I P
C L I P
C L A P
S L A P
S L A M
S L U M
G L U M
G L U E
F L U E
F L E E

CUSTARD PI 37

We need to know three things — the radii of the two cylinders and the value of Pi that has been used in the calculations. And we have three equations. For the first cylinder:

(1) Volume = Pi * $R1^2$ * L = 306.9
or, 10 * $R1^2$ * Pi = 306.9
(2) Surface area = 2 * Pi * R1 * L = 204.6
or, 20 * R1 * Pi = 204.6

For the second cylinder:

(3) Volume = 10 * $R2^2$ * Pi = 3410

Squaring equation (2):

(4) 400 * $R1^2$ * $Pi^2 = (204.6)^2$
From (1): $R1 = \sqrt{306.9/(10 * Pi)}$
From (4): $R1 = \sqrt{(204.6^2/(400 * Pi^2)}$

These two equations are equal. So, $Pi = (204.6)^2/(40 * 306.9) = 3.41$. This is the

incorrect value of Pi used. Using it, R1 can be calculated as 3 centimetres, and R2 as 10 centimetres. Using the correct value of Pi (3.14), the volumes of the two cylinders should be 282.6 and 3140 cubic centimetres respectively, and the surface area of cylinder one is 188.4 square centimetres.

AMMO. AMASS? 38

Using the expression given in the question and putting in the numbers for the minimum acceptable ammo level:

50 rounds = $10000/(\text{days}+1)^2$

or days = $\sqrt{10000/50} - 1$

= 13.142135 days

0.142135 of a day = 3.41124 hours = 3 hours 24.7 minutes

So, the ammo would fall to unacceptable levels at just before 10.25 am on the 13th day of the battle.

CODE CRACKER 39

If the numbers in the message are to be decoded by a computer, they are probably related in some way to the numbers that a computer uses to represent all the symbols that it can generate. For instance, the letter A is actually stored in a computer as the hexadecimal (base 16) number 41, which is equivalent to decimal (base 10) 65 (4 * 16, + 1). The question stresses that the code is 'low-level' and the decoding instructions are 'simple'; that is, you don't have to do much to the code numbers to convert them into something that produces a readable message. Let's assume that the agent used the most simple way of coding letters of the alphabet — he converted the letters of the original message into their equivalent computer numbers and then added another number to them. The following program reads in the code numbers and then prints out their equivalent computer symbols. Each time the printing loop at lines 60 to 90 is executed, a different number (SHIFT) is added to the code numbers. Line 70 checks whether this new number falls outside the range that would produce a letter or a space. If it does, the printing is stopped and a new SHIFT number tried. Line 110 is simply a time delay to stop the message coming up too quickly to read. Your computer may have a PAUSE command to do this. If you have no success with this program, check on how your computer uses CHR$ (in your computer manual). You may have to convert the code numbers into base 16. For instance, 41 (base 10) = 29 (base 16).

```
  5REM — CODE CRACKER
 10DIM DAT(15)
 20FOR N = 1 TO 15
 30READ DAT(N)
 40NEXT N
 50FOR SHIFT = – 15 TO 15
 60FOR N = 1 TO 15
 70IF (DAT(N) + SHIFT)<32 OR (DAT(N)
   + SHIFT)>126 THEN PRINT:PRINT:
   NEXT N
 90NEXT N
100PRINT:PRINT
110FOR T = 1 TO 1000:NEXT T
120NEXT SHIFT
130DATA 67, 63, 57, 72, 69, 22, 57, 62
140DATA 55, 66, 66, 59, 68, 61, 59
```

You should find that the only readable message that appears is:

M-I-C-R-O C-H-A-L-L-E-N-G-E

PASS MASTERS 40

Indians

Monday	3rd July	
Sun-up	5.30 am	
	12 noon	6½ hrs @ 4mph = 26 miles
	7.00 pm	
Sunset	10.30 pm	3½ hrs @ 3mph = 10½ miles
	4th July	
Sun-up	5.34 am	
	12 noon	6hrs 26mins @ 4mph = 25.72 miles
	7.00 pm	
Sunset	10.26 pm	3hrs 26mins @ 3mph = 10.30 miles
	5th July	
Sun-up	5.38 am	
	12 noon	6hrs 22mins @ 4mph = 25.47 miles
	7.00 pm	
Sunset	10.22 pm	3hrs 22mins @ 3mph = 10.11 miles
	6th July	
Sun-up	5.42 am	
	12 noon	6hrs 18mins @ 4mph = 25.2 miles
	7.00 pm	
Sunset	10.18 pm	3hrs 18mins @ 3mph = 9.9 miles
		Total = 143.2 miles

Redcoats

Monday	3rd July	
	10.30 pm	
	4th July	
	5.34 am	7hrs 4 mins @ 5mph = 35.35 miles
	10.26 pm	
	5th July	
	5.38 am	7hrs 12 mins @ 5mph = 36.0 miles
	10.22 pm	
	6th July	
	5.42 am	7hrs 20mins @ 5mph = 36.65 miles
	10.18 pm	
	7th July	
	5.46 am	7hrs 28mins @ 5mph = 37.35 miles
		Total = 145.35 miles

So, at 5.46 am on July 7th, as the Indians are setting out on the last couple of miles to the Pass, Carruthers is already there.

A SITTING FEAT 41

You can solve this by calculator or computer. It's a simple matter of doing a few sums — calculating the price in each year and the percentage increase over the previous year. The following program will do just that.

```
 10REM — SHOE HORNS
 20PRINT "YEAR", "PRICE",
   "PERCENTAGE INCREASE"
 30PRINT "(1940 + )", "(cents)", "ON
   PREVIOUS YEAR"
 40PRINT
 50FOR YEAR 1 = 0 TO 8
 60LET YEAR 2 = YEAR 1 + 1
 70LET PRICE 1 = YEAR 1 ^ 2 + YEAR
   1 + 4
 80LET PRICE 2 = YEAR 2 ^ 2 + YEAR
   2 + 4
 90LET PERCENT = (PRICE 2 –
   PRICE1)/PRICE 1 * 100
100PRINT ;YEAR 2,;PRICE 2,; INT
   (PERCENT + 1); "%"
110NEXT YEAR 1
```

The loop at lines 50 to 110 takes each two successive years in the range and calculates the percentage increase in price between them. The only years between which the increase was between 30% and 35% were year 7 and the previous year — that is 1946 and 1947.

ONE MAN WENT TO MOW 42

As you might imagine, the total cutting length travelled by the mower is the same for each mowing pattern and so the total cutting time is the same. Swinging the mower round at the end of each strip makes the difference and so you would expect the mowing pattern with the most turns (i.e. mowing parallel to the short edges) to take the longest time, but how much longer?

(1) Mowing parallel to the short edges. Herb mows 240 (120/0.5) 85-metre strips and requires 239 turn-rounds, each taking 5 seconds. The cutting time is the distance covered divided by the speed, or (240 * 85)/2 — that is, 10,200 seconds. Add the turns time to this — 239 * 5 = 1,195 seconds. Total = 11,395 seconds.

(2) Mowing parallel to the long edges. Herb mows 170 (85/0.5) 120-metre strips and requires 169 turn-rounds, each taking five seconds. The cutting time is (170 * 120)/2 = 10,200 seconds, as before. The turns time is 169 * 5 = 845 seconds. Total time = 11,045 seconds.

So, Herb will save 350 seconds (almost six minutes) by mowing the lawn parallel to the long edges — time enough to do anything else Lady Chatterbox has in mind.

THE GRID-IRON GAME 43

9	2	5	7
6	8	8	2
2	6	1	8
3	4	6	3

GO FER YER GUN 44

You can solve this very simply by just writing down the shots fired and the number of rounds left.

LEFT GUN	RIGHT GUN	AMMO LEFT
6	6	12
– 1	—	11
—	– 3	8
– 4	—	4
—	– 2	2
– 1	—	1
—	—	
0	1	

So, the sheriff has just one round left and Gus is shuffling off to the town jail for an early bath.

PROGRAM POSER 45

Although this problem has a four-star difficulty rating because it requires access to a computer to verify your answer, it should be relatively easy if you're already acquainted with BASIC. It asks for six numbers and then shuffles them about until they're in numerical order ascending from left to right.

NUMBER CRUNCHING 46

You can systematically try every combination of four one-digit numbers yourself until you find the answer, but it's an awful lot easier to write a program to do it. The following program does the trick in a fraction of the time. As divisions by A, B and D occur in the four expressions, you can be sure that these are not zero. Indeed, if you try solving the problem by computer using zero values for A, B and D, the computer will throw the program out with an error message.

```
 10REM — ABC
 20FOR A = 1 TO 9
 30FOR B = 1 TO 9
 40FOR D = 1 TO 9
 50IF (B * 10 + D)/A = 24 THEN GOSUB 100
 60NEXT D
 70NEXT B
 80NEXT A
 90END
100LET C = 24 * A/D
```

```
110LET P = (C/B) * D + (A * C)
120LET Q = ((10 * A + B)/D) * (D – A) + C
130IF P = 24 AND Q = 24 THEN PRINT "A
   = ";A,"B = ";B,"C = ";C,"D = ";D:END
140RETURN
```

You should find that A, B, C and D are 2, 4, 6 and 8 respectively.

WORLDS APART 47

(1) Jupiter's volume

The circumference (C) of a circle is related to its radius (R) by:

$C = 2PiR$

So, Jupiter's radius is:

$C/(2 * Pi) = 71676$ km

And its volume is:

$(4/3) * Pi * R^3 = 1.5416636 * 10^{12}$ km

(2) Earth's volume

The radius of a circle is half of its diameter, 6378.15 km in the case of the Earth. So, its volume is:

$(4/3) * Pi * (6378.15)^3 = 1.0863068 * 10^9$ km

And the ratio of Jupiter's volume to Earth's volume is:

$1.5416636 * 10^{12}/1.0863068 * 10^9 = 1419$

In other words, 1419 Earths would fit inside Jupiter. The true figure is actually rather less than this because the planets are not perfect spheres.

ALPHABET SOUP 48

DEVIOUS DIGITS 49

9	+	3	–	6	+	4
+		+		–		+
7	–	4	+	1	+	8
–		–		–		–
2	+	5	+	3	–	7
+		+		+		–
8	–	9	+	5	+	3

THE PHARAOH'S KEY 50

The problem is to find the relationship between number 1 and '3' in the series, number 2 and '9', number 3 and '19', etc. From the first number in the series, it seems likely that the relationship is:

series number $= 2(N) + 1$

but this doesn't work for the other numbers. Look at the clues in the question — '. . . the twin unknown squares plus the trilogy' . . . or:

$2 * (x)^2 + 3$

So, number 1 is $2 * (1 – 1)^2 + 3 = 3$
number 2 is $2 * (2 – 1)^2 + 3 = 5$
number 3 is $2 * (3 – 1)^2 + 3 = 11$

This relationship works for the whole series and the final number (N = 10) can be calculated easily as:

$2 * (10 – 1)^2 + 3 = 165$

TANK ALARM 50

This simple program monitors the situation in the tank every minute (T = time, lines 20 and 110). It converts the Centigrade temperature into Kelvin (line 30) and calculates the increase in temperature from minute to minute (line 50). Lines 60 and 70 increase the pressure by the same percentage. Lines 80 to 100 check to see if any of the alarm conditions have been encountered. If any have, the appropriate message is flashed on to the screen. If not, the time counter is increased by one and the program repeats.

```
10REM — ALARMS
20LET T = 0
30LET TEMP = – 36 + 273
40LET PRESS = 10
50LET TEMP2 = TEMP + 1.5
60LET MORE = TEMP2/TEMP
70LET PRESS = MORE * PRESS
80IF TEMP2> – 4 + 273 AND PRESS>12
  THEN PRINT "Both alarms sound after
  ";T;" minutes":END
90IF TEMP2> – 4 + 273 THEN PRINT
  "Temperature alarm sounds first, after
  ";T;" minutes":END
100IF PRESS>12 THEN PRINT "Pressure
  alarm sounds first, after ";T;" minutes
  ":END
110LET T = T + 1
120LET TEMP = TEMP2
130GOTO 50
```

Using this program, you should find that the temperature alarm goes off first, after 21 minutes.

SUBSCRIPTIONS

SOMETHING MISSING?

No, this isn't a prize puzzle and the answer to the question is at the bottom of this page. To make sure you always have the right answer you can take out a subscription to Micro Challenge — in that way you'll never miss a single copy or be left wondering about the answers to our challenging and exciting prize puzzles.

A yearly subscription to Micro Challenge makes a good present for a friend or relative; and remember, there are no postal charges for copies sent to addresses within the United Kingdom. One year's subscription (12 issues) costs just £12.00 — we pay the postage. The only postal charge you'll have to pay is 13 pence for the stamp when you send in the form on this page.

Simply fill out the order form (make sure you tell us when you want the subscription to begin), enclose your cheque or postal order for £12.00 and we'll do the rest. It couldn't be easier . . .

Rates for overseas subscriptions, sent either surface or air mail, can be supplied on request from the Micro Challenge Subscriptions Department, Somers House, Linkfield Corner, Redhill, RH1 1BB.

Name . . . . . .
Address . . . . . .
. . . . . .
. . . . . .
Start Date (Month) . . . . . .
I enclose a cheque/postal order for £ . . . . . .

(Make cheques payable to **Micro Challenge**)

SEND TO

Micro Challenge
Subscriptions Department,
Somers House,
Linkfield Corner,
Redhill,
RH1 1BB.

SHOPPING CHARADE 50

From the question, we can say that:

(1) 59A + 110B + (3 * 391) + 90C = 5000
(2) A + B + 3 + C = 51
(3) C = B + 3

Multiplying (2) by 59:

(4) 59A + 59B + 177 + 59C = 3009
(1) – (4) 51B + 31C = 995

Substituting in this for C as in (3)

51B + 31B + 93 = 995
B = 11

From (3)

C = 14

From (2)

A = 51 – B – 3 – C = 23

A LITTLE LIGHT WORK 50

You could do this with pen and paper, with or without a calculator, but just in case you're addicted to program writing, here is a short listing to solve the problem.

```
10REM — LIGHT WORK
20LET VOLTS = 240
30LET AMPS = 3
40LET POWER = VOLTS * AMPS
50LET USED = 200 + 60 + 100 + 180 + 100
   + 60
60PRINT "Power consumed by lights =
   ";USED;" watts"
70IF USED + 60>POWER THEN PRINT
   "Adding another 60-watt fitting will
   blow the fuse ":END
80PRINT "A 60-watt fitting can be safely
   added without blowing the lighting
   circuit fuse" :END
```

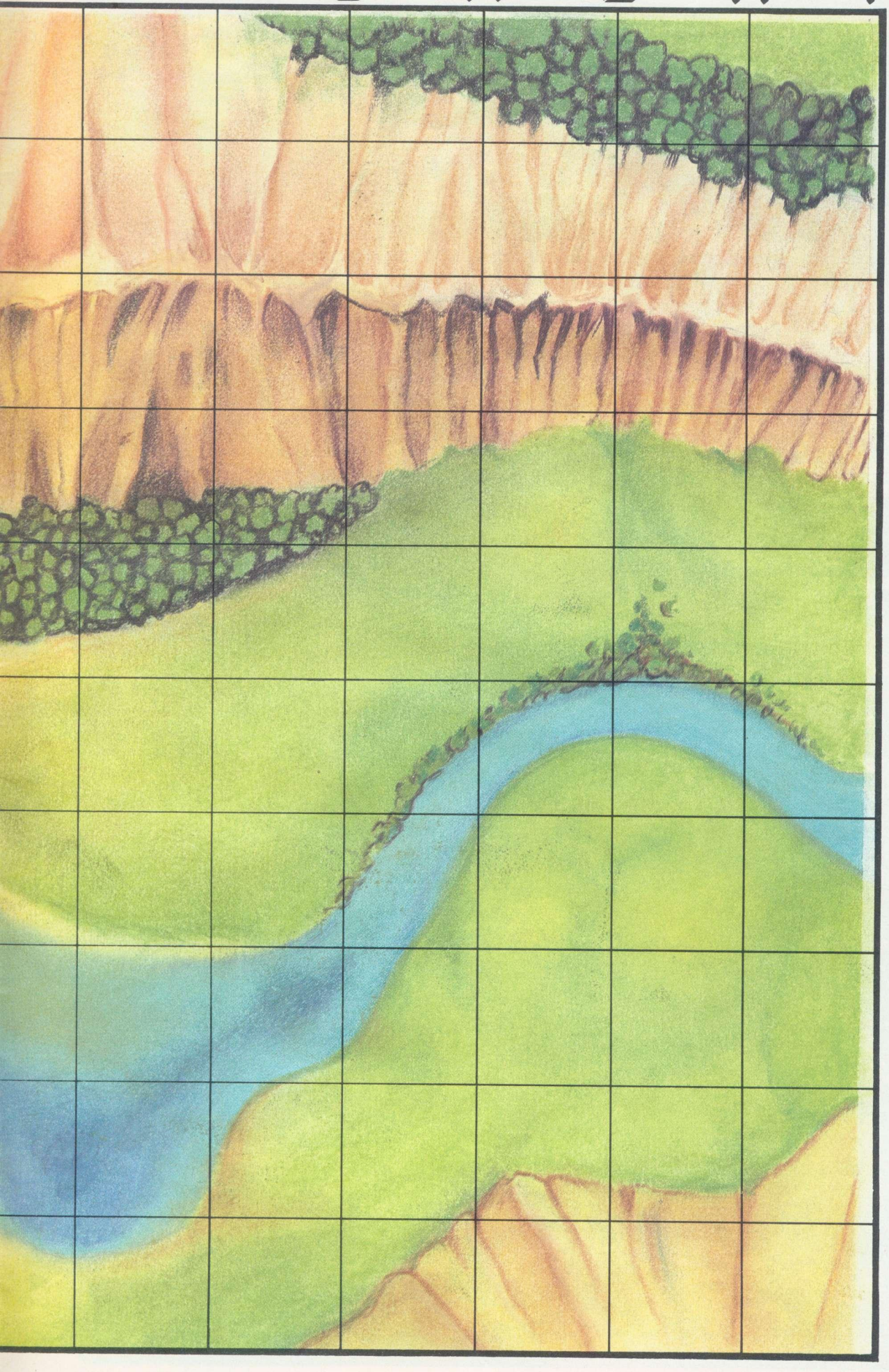
A 240 volts supply at 3 amps will supply a power demand of up to 720 watts, so an extra 60-watt bulb will overload the circuit and blow the fuse.

LAST MONTH'S PRIZE PUZZLES

AUGUST ANSWERS WILL BE PUBLISHED IN THE OCTOBER ISSUE

MICRO CHALLENGE

H I J K L M N



TREASURE MAP

CLUES

Here are the next four clues to help you find the hi-tech treasure. Use your skill and general knowledge to discover the letter/number co-ordinates so that you can find your way around Boristia. The clues are in no particular order and co-ordinates can be read either way (eg A2 or 2A). Remember — the route follows a logical path around major obstacles — there are no tunnels, space walks, black holes or similarly devious diversions — at least, we don't think so . . .

- **Say hi initially to an American amendment**
- **As the song goes, sounds like a jolly good fellow . . .**
- **In France she goes for Harry Lime's number**
- **If the number's ahead, it could mean a raid**

CUSTARD PI

Too many accountants spoil the Pi. Can you bring it back to the straight and narrow?

In an effort to cook the books of his ailing company, Honest Ron has made a few changes to the accounts. He has made it look as if the company has used more materials than it actually has, by using an incorrect value of Pi to calculate the surface areas and volumes of items. An auditor routinely checks a few figures. The volumes of two 10 centimetres long cylinders are shown in the books as 306.9 and 3410 cubic centimetres. The surface area of the first cylinder is also shown as 204.6 square centimetres. If the surface area of a cylinder is given by:

$$\text{Surface area} = 2 * Pi * R * L$$

where R is the cylinder's radius and L is the length, and the volume of a cylinder is given by:

$$\text{Volume} = Pi * R^2 * L$$

how can he calculate the incorrect value of Pi used and the true volumes and surface area?

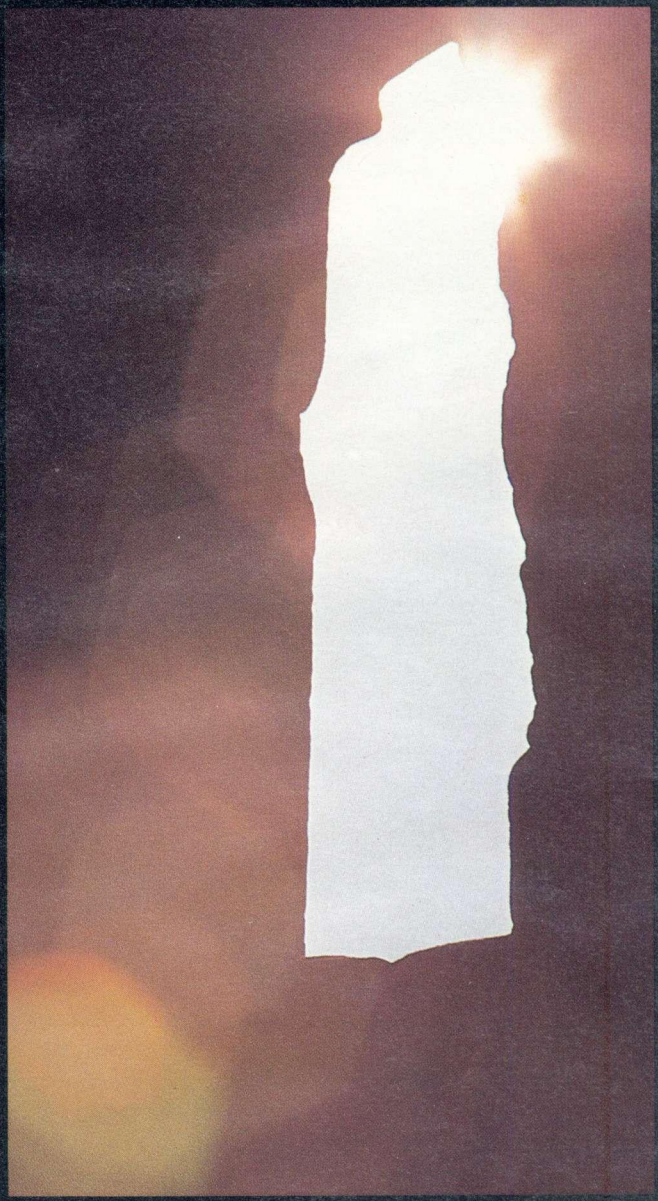
WORKSPACE

TARGET TIME MINS. YOUR TIME.....

Illustration: Phil Gerring

AMMO, AMASS?

Pass the ammunition, we're going to advance. What ammunition? Oops!!



In the battle of Gobbit's Gulch, a minor skirmish of the American War of Independence, the British commander, General Seaworthy-Clenchpipe, had victory in his sights when the British muskets fell silent. The General hadn't established secure supply lines. The American forces rallied, took the Gulch and the hungry soldiers opened the first MacTavish hamburger store. Thus, the forgotten battle of Gobbit's Gulch changed the history of the Western world. If General Seaworthy-thingy had known that his ammunition was declining from an initial stock of 10,000 rounds at a rate described by the equation.

Number of rounds of ammunition = 10,000/(days of battle) + 1)^2

At what time on which day of the battle could he have predicted that his ammo fall below the minimum acceptable level of one round per man of his 50-strong force, assuming that his men fired their muskets at a constant rate between 7 am and 6 pm (no tea breaks!)?

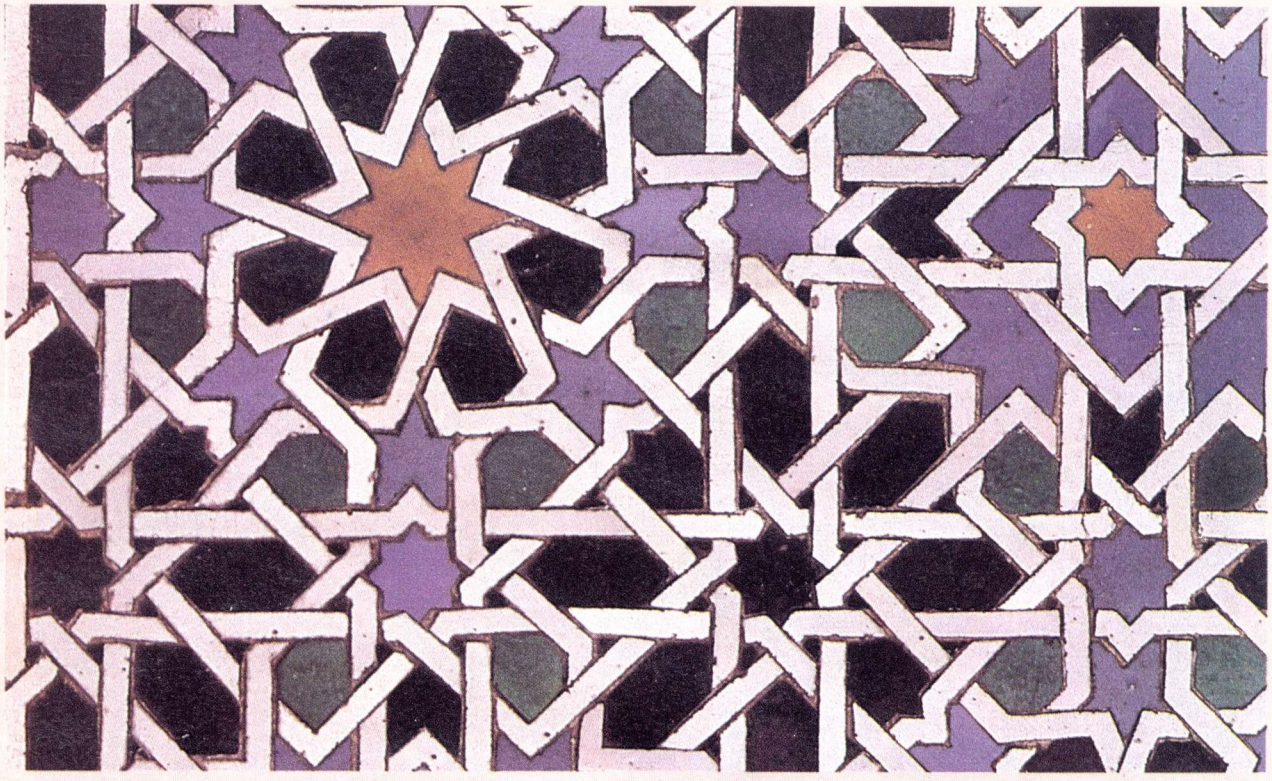
WORKSPACE

TARGET TIME 10 MINS. YOUR TIME.....

Illustration: Tudor Rose

CODE CRACKER

Crack a code and reveal the secret message



Secret agent Spond, Jane Spond, has relentlessly pursued enemy agent Silverthumb and relieved him of a secret message. The coded message contains the name of the next target of the evil organisation, SLUSH. The low-level code is a series of decimal numbers representing letters and spaces. They are decoded by feeding them into a computer programmed with a simple set of decoding instructions. Your mission is to write a decoding program. This magazine will now self-destruct in five seconds!

CODED MESSAGE: 67, 63, 57, 72, 69, 22, 57, 62, 55, 66, 66, 59, 68, 61, 59

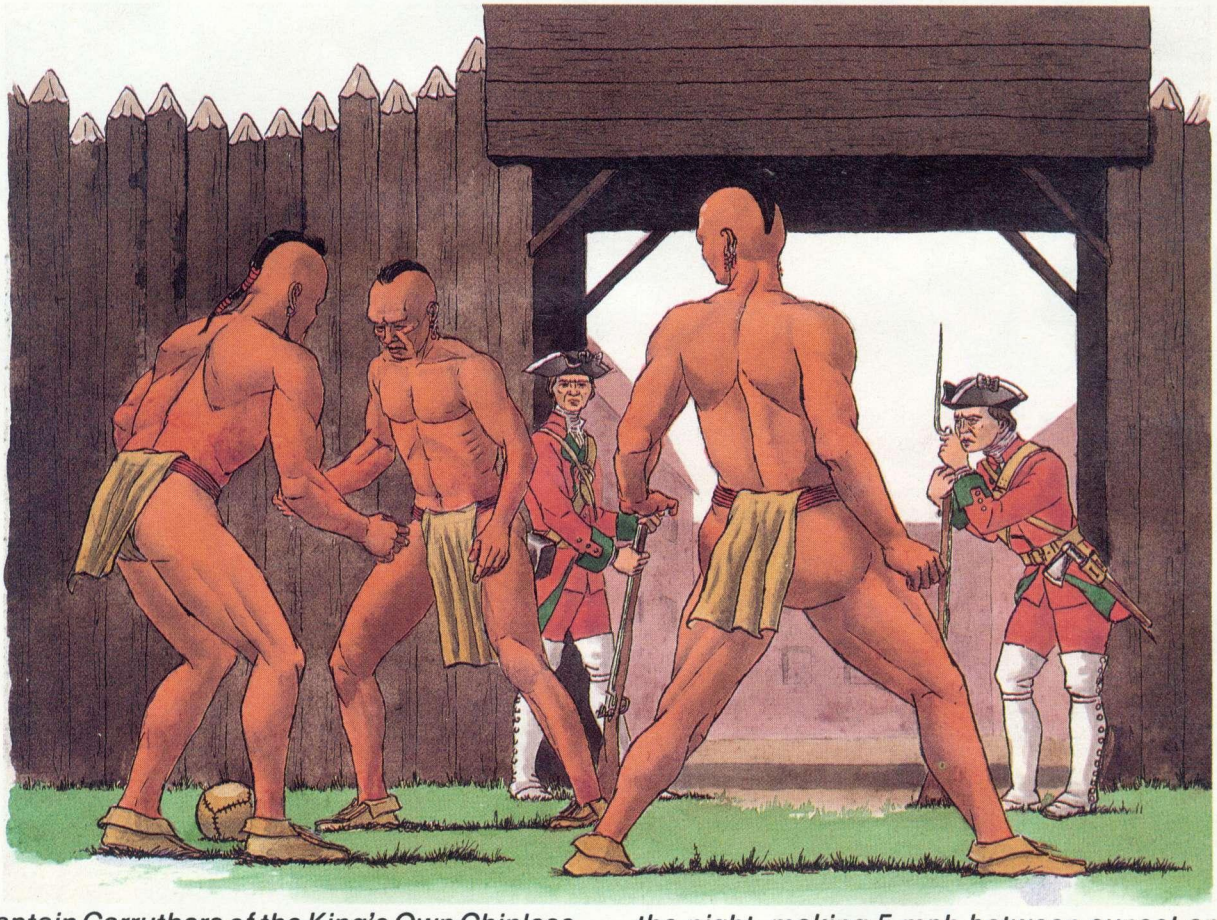
WORKSPACE

TARGET TIME 25 MINS. YOUR TIME.....

Illustration: W. Falconer

PASS MASTERS

Can Carruthers and his Redcoats head the Redskins off at the Pass?



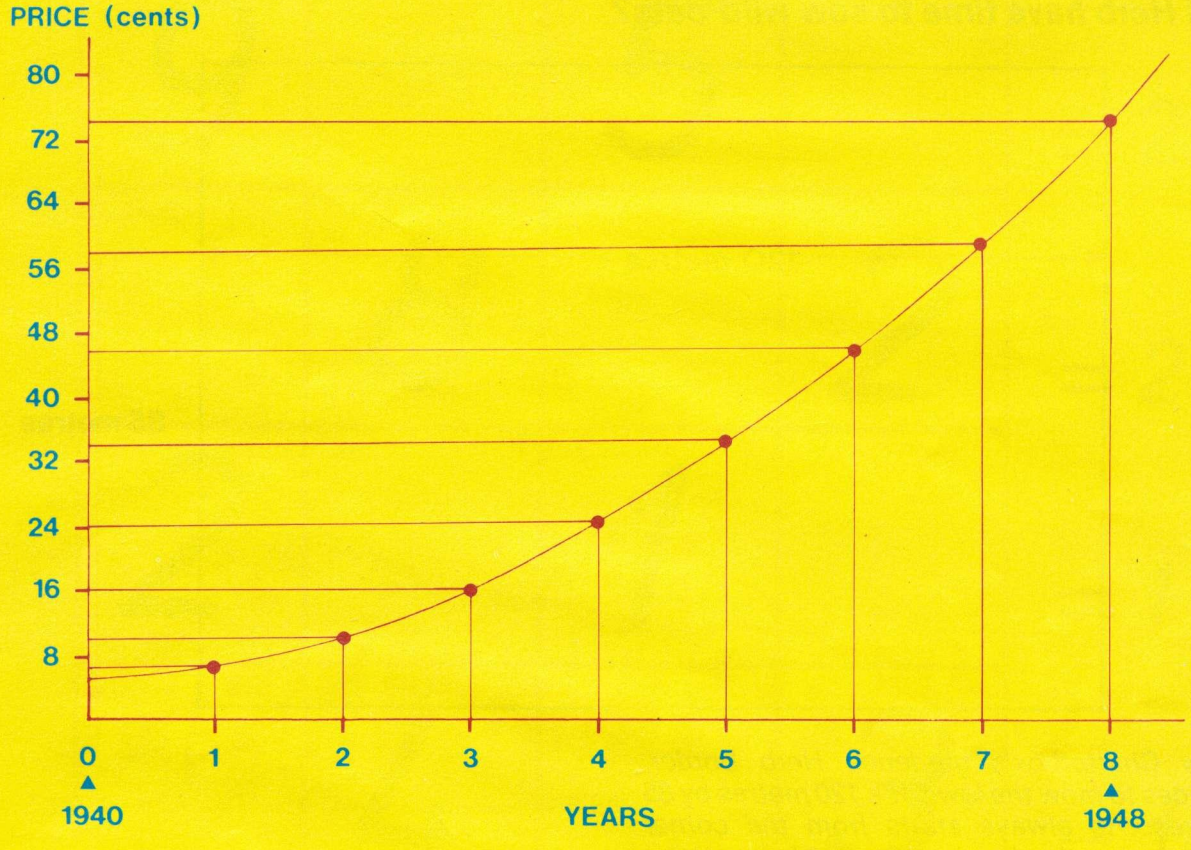
Captain Carruthers of the King's Own Chinless Wonders has received intelligence reports that Mohican raiders are heading for Fort Iffy Kayshun. The only way to the Fort is through the treacherous Itscumtuapritti Pass. The Indian group jogs along at 4 mph between sun-up and noon, and again at 3 mph between 7.30 pm and sundown. Captain Carruthers' men can only travel, in their heavy woollen uniforms and carrying weighty backpacks, by the cool of the night, making 5 mph between sunset and sunrise. If the Redcoats and the Indians are both 145 miles from the Pass and the Indians set out first, who gets there first? Sun-up on the first morning (Monday July 3rd) is at 5.30 am and sunset at 10.30 pm. To complicate matters, sun-up happens 4 minutes later every morning and sunset occurs 4 minutes earlier each night.

WORKSPACE

TARGET TIME 20 MINS. YOUR TIME.....

A FITTING FEAT

A simple calculation — but don't put your foot in it!



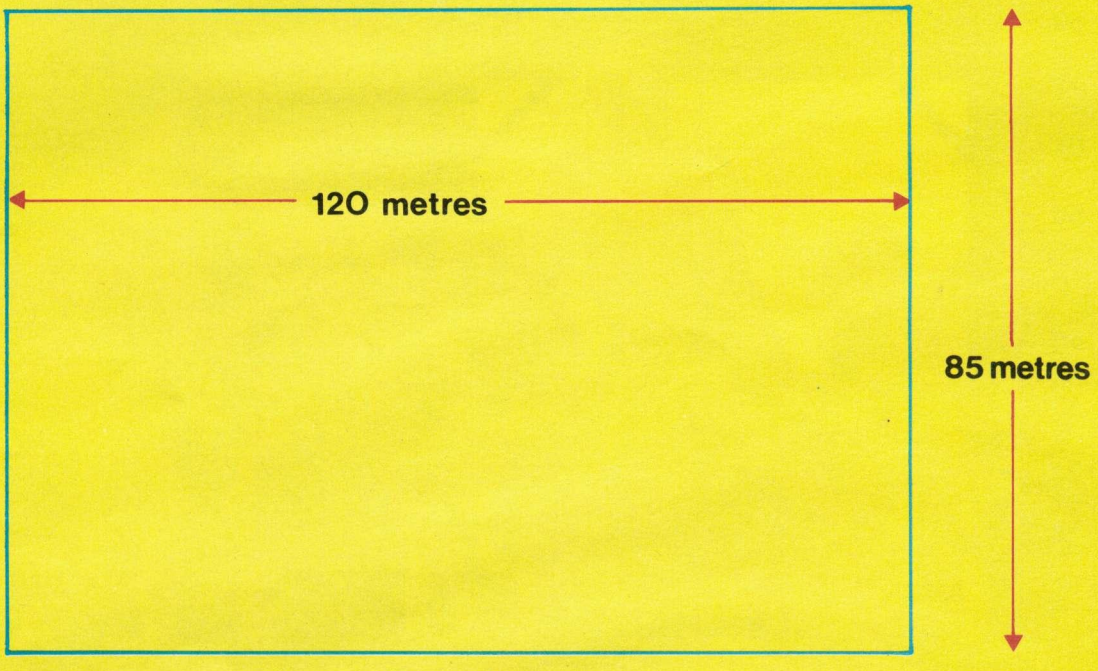
The graph shows how the price of one brand of shoe horns in the American state of Illinois rose between 1940 and 1948. Find two consecutive years between which the increase in price was between 30 and 35 percent.

WORKSPACE

TARGET TIME 10 MINS. YOUR TIME.....

ONE MAN WENT TO MOW

Will Herb have time to sow wild oats?



Lady Chatterbox's gardener, Herb Border, decides to mow the lawn. It's 120 metres by 85 metres. He always starts from the corner indicated on the drawing. He could mow strips parallel to either the short or the long edges. If the mower trundles along at two metres per second, it takes Herb five seconds to swing the mower round at the end of each strip for the return journey and the cut width is 50 centimetres, which is the quicker of the two methods to mow the lawn, and how much time will Herb save?

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

THE GRID-IRON GAME

Another head-scratching numbers grid

9		5		= 23
	8		2	= 24
2		1		= 17
	4		3	= 16
= 20	= 20	= 20	= 20	

When Micro Challenge's marvellous mathematician made this matrix, he wrote the numbers in his bestest joined-up writing on adhesive labels. But, horror of horrors, some of the labels have come adrift. Fortunately, the line totals are still in place. All you have to do (!) is to put the numbers back in the correct positions.

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

GO FER YER GUN

Here a shot, there a shot, everywhere a pot shot, but who comes out on top?

Garrulous Gus the grumpy gunslinger strolls up to the saloon and challenges the sheriff to a shoot-out. The two men bob and weave along the High Street, taking pot shots at each other with their six-shooters. The sheriff fires his left gun once and looses off 25 percent of his initial ammunition from his right gun. He now fires half of all his remaining ammunition from the left gun, half of all remaining ammunition from his right gun and one more shot from his left gun. He then hears Gus's guns clicking. Gus has run out of ammunition. Does the sheriff have any live ammunition left with which to take Gus prisoner?

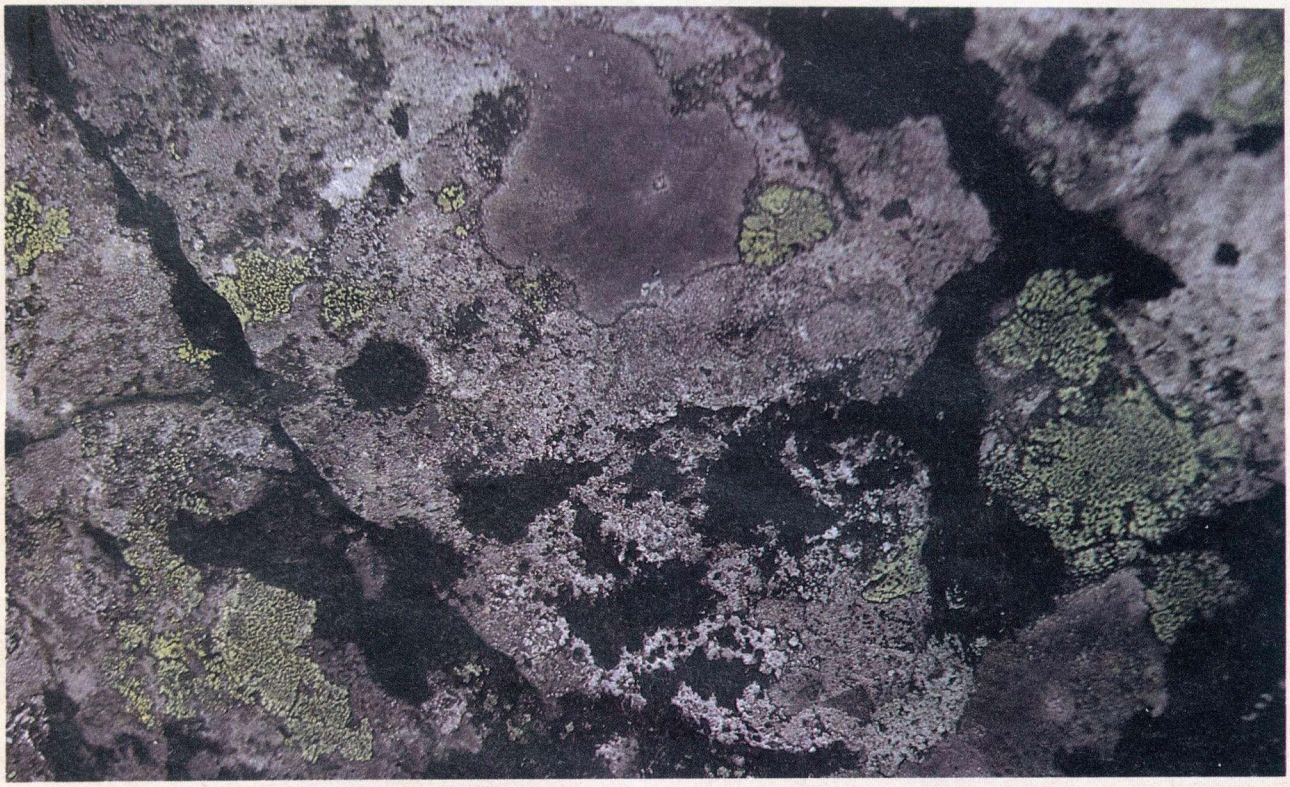
WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

Illustration: Phil Gerring

PROGRAM POSER

It's certainly a computer program, but what does it do?



```
10REM — MYSTERY
20DIM A(6)
30FOR N = 1 TO 6
40INPUT A(N)
50NEXT N
60FOR C = 1 TO 5
70FOR N = 1 TO 5
80LET X = A(N) – A(N + 1)
90IF X >0 THEN GOSUB 160
100NEXT N
110NEXT C
120FOR N = 1 TO 6
130PRINT ;A(N); " – ";
140NEXT N
150END
160LET T = A(N)
170LET A(N) = A(N + 1)
180LET A(N + 1) = T
190RETURN
```

Finders keepers; losers have their Micro Challenges confiscated. You have in your hand a piece of paper upon which one of Mr Epson's automatic writing machines has inscribed this listing. But what does it do? That's all you have to find out — study the listing and predict exactly what it will do.

WORKSPACE

TARGET TIME 15 MINS. YOUR TIME.....

Illustration: W. Falconer

NUMBER CRUNCHING

How well do you know your A, B, Cs?

*(1) (C/B) * D + (A * C) = 24*
(2) BD/A = 24
*(3) (C * D)/A = 24*
*(4) AB/D * (D – A) + C = 24*

In these four equations, A, B, C and D represent four different single digit numbers. All you have to do is find out what the four numbers are. Note: BD is not B times D; it is (B 10) plus D.

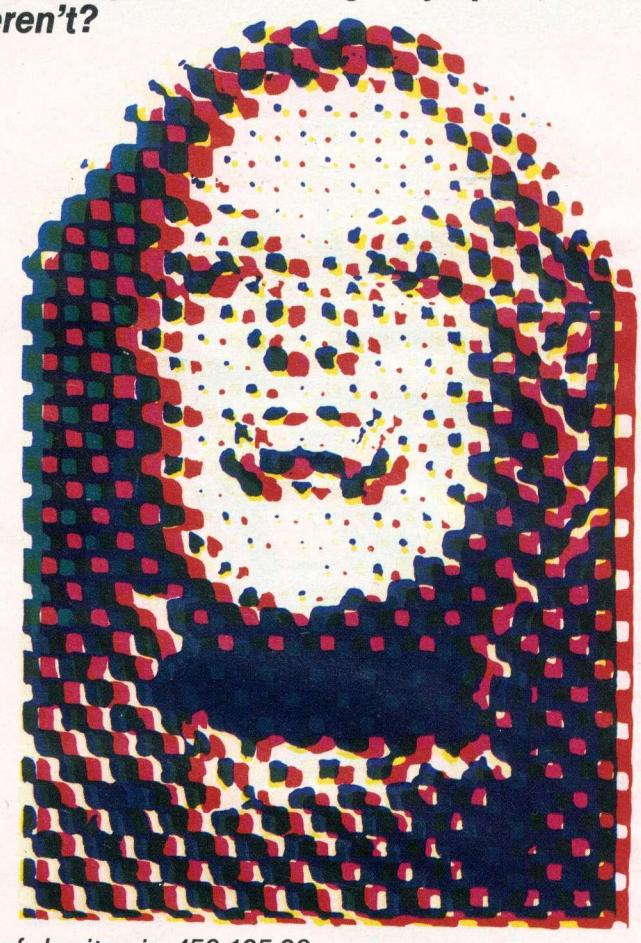
WORKSPACE

TARGET TIME 15 MINS. YOUR TIME.....

Illustration: Tudor Rose

WORLDS APART

Luckily the Earth and Jupiter are a long way apart, but what would happen if they weren't?



If the circumference of Jupiter is 450,125.28 kilometres and the diameter of the Earth is 12,756.3 kilometres, how many Earths would fit inside the other planet if they did collide and the Earth was swallowed up by the great gas giant? Assume that both planets are perfect spheres and the volume of a sphere is given by:

$$volume = (4/3)PiR^3$$

where R is the sphere's radius and Pi = 3.14

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

Pic: Perri-Danielle Foot, Footprint

ALPHABET SOUP

An apparently meaningless addition needs a little thought

```
 ABC
 DEF
 ---
 EFD
```

A, B, C, D, E and F represent six different one-digit numbers. All you have to do is find out what they are. The only clues you have are that A is in the range 1-5 inclusive; B, 2-6; C, 1-4; D, 1-4; E, 4-8; F, 6-9. In fact, more than one set of numbers will work. How many solutions are there?

WORKSPACE

★★★★

TARGET TIME 15 MINS. YOUR TIME.....

Illustration: Niki Kyriakidou

DEVIOUS DIGITS

Replace the wayward digits

9	+	3	−		+	4	= 10
+		+		−		+	
	−		+		+		= 12
−		−		−		−	
	+		+		−		= 3
+		+		+		−	
8	−		+	5	+	3	= 7
= 22		= 11		= 7		= 2	

The number grid has been vandalised. Several numbers in the grid have been smeared with vanishing cream . . . and they've vanished! To help you along, the totals of the rows and columns are shown around the edge of the grid.

WORKSPACE

TARGET TIME 15 MINS. YOUR TIME.....

50 BITS

THE PHARAOH'S KEY

Find the last number in the series to open the Pharaoh's tomb

British archaeologist, Lord Sandisocks, has found what appears to be the tomb of Gladys, the favourite wife of Pharoh Upppandattum. Hieroglyphs on the tomb's entrance issue the customary curse on all who enter and then give a clue as to how to open the enormous stone doors safely. The pictograms say — 'He who adds the twin unknown squares to the trilogy will enter the tomb unharmed'. Beneath the inscription is this series of numbers:

3, 9, 19, 33, 51, 73, 99, 129, 163, ???

All you have to do is find the last number in the series.

WORKSPACE

TARGET TIME 15 MINS. YOUR TIME.....

TANK ALARM

A tank of chemicals is maintained at −36 degrees Centigrade at a pressure of 10 tonnes per square metre (1 tonne = 1,000 kilograms). A fault develops in the refrigeration plant and the tank's temperature begins to rise at 1.5 degrees per minute. The pressure inside the tank is directly proportional to the temperature (i.e. doubling the temperature doubles the pressure), but in this relationship, the temperature is measured on another scale — the Kelvin scale. Zero degrees Centigrade = 273 degrees Kelvin, and a degree rise in Centigrade is the same as that in Kelvin. The tank's temperature alarm sounds at −4 degrees Centigrade and its pressure alarm sounds at 12 tonnes per square metre. Which alarm goes off first?

WORKSPACE

TARGET TIME 20 MINS. YOUR TIME.....

A LITTLE LIGHT WORK

Confucius say, 'Many hands make light work . . if the fuse doesn't blow!'

One of the lighting circuits in a house powers all the lighting on the ground floor. The lounge has a central light fitting with two 100-watt bulbs and a wall fitting with a 60-watt bulb. The dining room has a central 100-watt bulb and three 60-watt spotlights. The kitchen is illuminated by two 30-watt fluorescent fittings. There is also a single 60-watt bulb in the hall. Could the occupier add another fitting with a 60-watt bulb to light up a dark corner in the hall without blowing the 3 amp circuit fuse? All you need to know is that:

Power (watts) = volts (240) × amps (3)

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

SHOPPING CHARADE

Come on down and see if the price is right

Shirley Shrivelgrommet the shoddy shopper has spent $50 on the week's shopping. She has bought 51 items. An unknown number cost 59 cents each, a different unknown number cost $1.10 each, three items cost $3.91 each and an unknown number cost 90 cents each. There are as many 90-cent items as there are $1.10 and $3.91 items put together. Find the unknown numbers.

WORKSPACE

TARGET TIME 5 MINS. YOUR TIME.....

EVEN THE PRICE WILL KEEP YOU IN THE BLACK

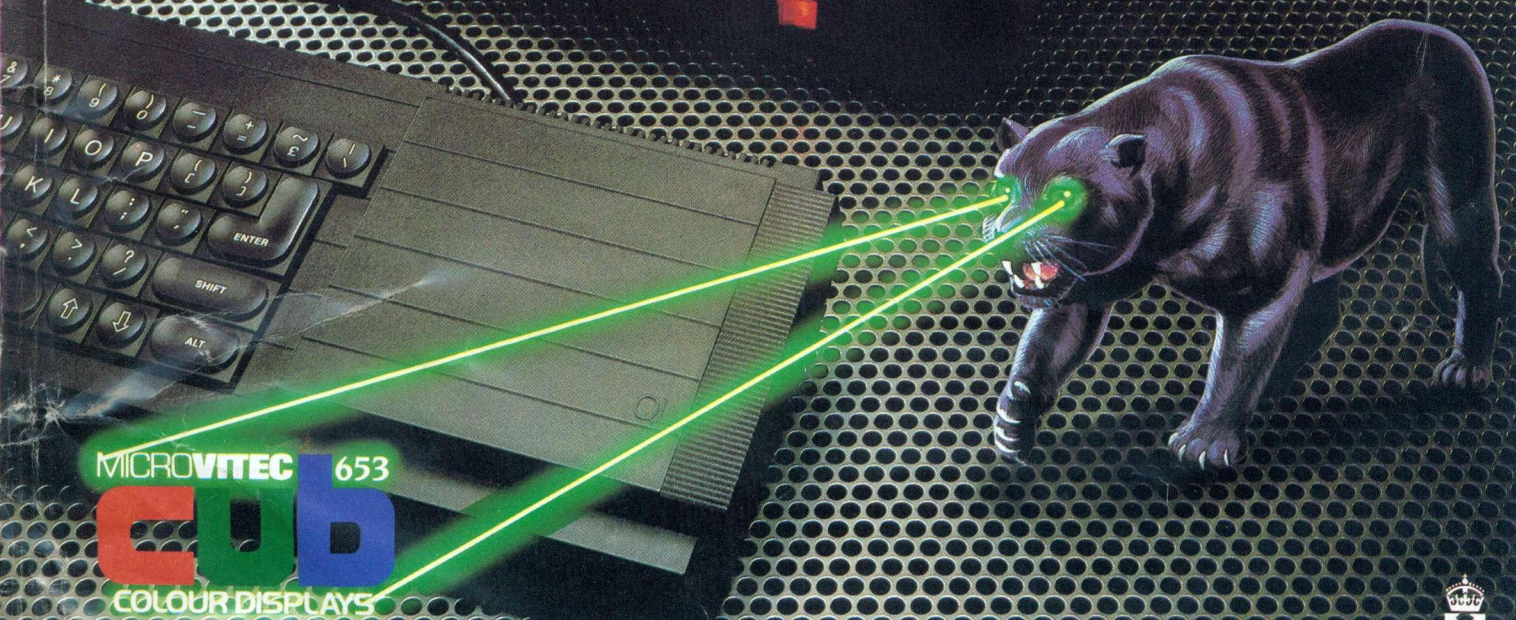
This sleek, black Microvitec CUB medium resolution colour monitor has been designed to be totally compatible with the Sinclair Q.L. An ability to display 85 column text is combined with outstanding graphic capabilities – at a price that won't break the bank.

£275
(inc. VAT)

Specification

Model:
CUB 1451/DQ3
14" Q.L. Monitor
RGB TTL input
Tube Resolution (pixels)
653(H) x 585(V)
Dot Pitch 0.43mm
Bandwidth 18 MHz

Also available in Standard Resolution version for only £225 inc. VAT.



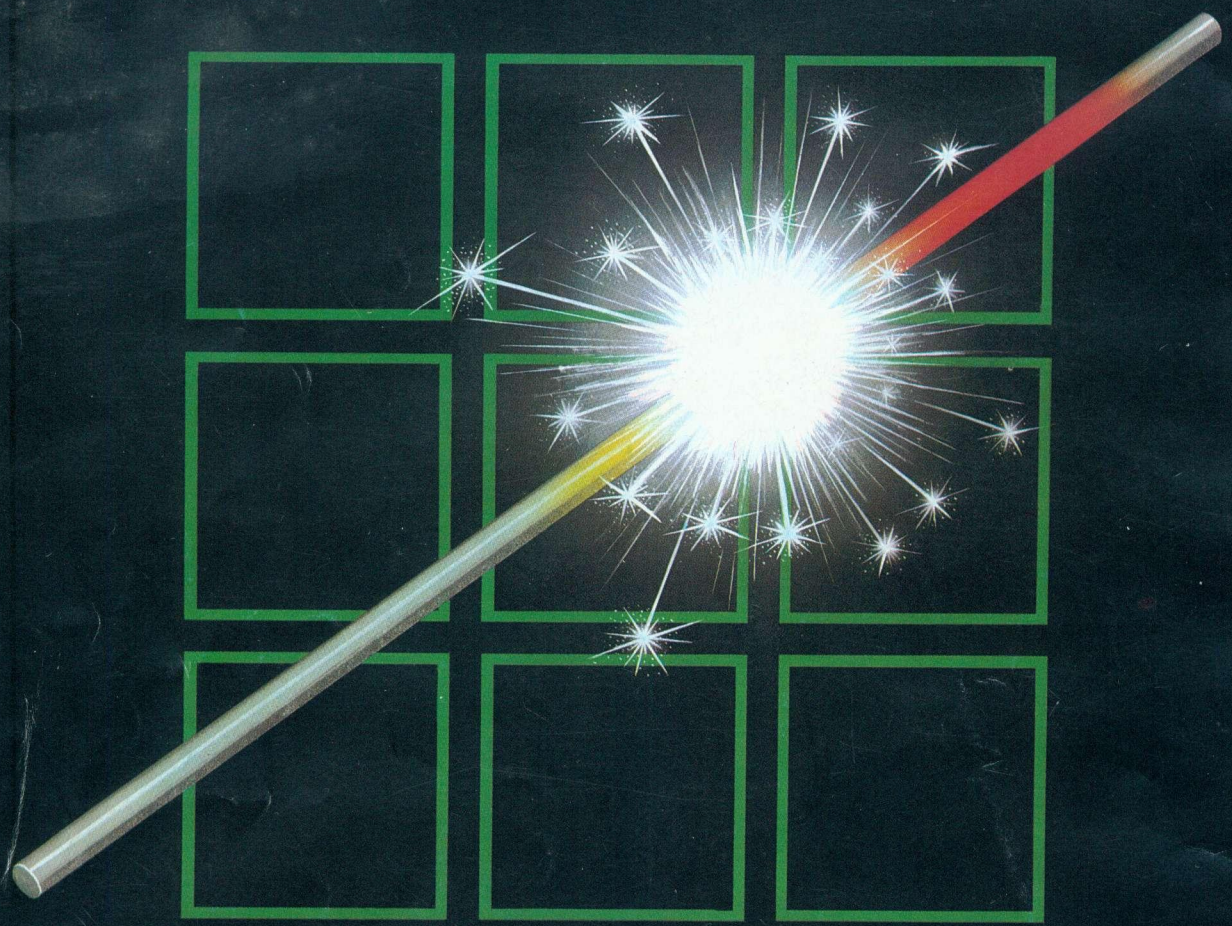
MICROVITEC 653
CUB
COLOUR DISPLAYS

Microvitec PLC, Futures Way, Bolling Road, Bradford BD4 7TU, West Yorkshire. Tel: (0274) 390011. Telex: 517717

1984

INCENTIVE

confuzion



THE FUZION OF MIND AND MACHINE

★ AMSTRAD ★ SPECTRUM ★ COMMODORE 64 ★ BBC B ★ ELECTRON ★

Price £6.95 Trade and Credit Card orders: Telephone (0734) 591678

INCENTIVE, 54 London Street, Reading RG1 4SQ